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N.V.M.A. Congress Papers

No. 5.—THE DIAGNOSIS OF GASTRIC AND INTESTINAL DISEASES IN THE DOG AND CAT*

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When the Provisional Committee did me the honour of inviting me to present a paper to the Clinical Section of this Congress, it suggested as the title "Gastric and Intestinal Diseases of the Dog and Cat." The subject being such a large one, I was taxed as to the best angle from which it should be tackled and upon which aspect of it I might be able to say something of use to you. The skill of a clinician is directly proportional to his ability as a diagnostician, for it is upon the accuracy of diagnosis that rational therapy depends, and I thus suggested that it be "The Diagnosis of Gastric and Intestinal Diseases of the Dog and Cat."

I found, however, on collecting my thoughts, that the remarks which I am about to make would have been more correctly headed by the title "The Diagnosis of Diseases, the Predominant Symptoms of which are associated with the Stomach and Intestine." The whole of the abdominal viscera are so intimately linked up by the reflexes that one cannot review the symptoms exhibited by disease of one without considering the others. This fact especially applies to the diagnosis of disease in animals. The inability of our patients to speak, whilst making diagnosis more difficult, stimulates keener observation, and a keener appreciation of objective symptoms, which in turn, leads to greater accuracy.

Another reason for paying so much attention to the subject of differential diagnosis is, that further experience teaches me that many of the conditions we meet and, on a cursory examination, are inclined to ascribe to diseases of the alimentary canal, are in fact due to disease of some other organ of the abdomen. I know of no diagnosis which is so abused as that of "gastritis." One is struck by the comparative infrequency with which this condition is encountered on *post-mortem* examination.

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I propose to make as a basis for my remarks the cases encountered during the past 12 months in the Poor Out-Patients' Department of the Royal Veterinary College.

CONDITION.	CASES ENCOUNTERED.	REMARKS.
Distemper ...	116	In all these gastro-intestinal symptoms predominated.
Ascarides ...	34	Parasites or eggs found in fæces, all in puppies 6 months and under.
Mechanical causes ...	10	Teething puppies.
Intussusception .	6	

CONDITION.	CASES ENCOUNTERED.	REMARKS.
Nephritis:		
(*a*) Acute and Sub-acute	10	2-2 years.
(*b*) Chronic ...	59	All others 5 and over.
Neoplasia ...	14	
Hepatitis ...	13	
Acute toxæmias	12	No positive diagnosis made.
Impaction colon	6	
Rectal stricture	2	
Foreign bodies	7	Œsophagus ... 2 Jejunum ... ... 2 Colon ... ... 1 Stomach 2
Volvulus ...	1	Ileum ... ... 6 m. puppy.
Pyometra ...	20	
Chronic enteritis ...	10	
Chronic colitis	3	
Unclassified ...	102	No definite diagnosis made.

It will be seen that of the 3,327 individual cases attended, approximately 13 per cent. were of the class we are considering; that is, the predominant symptoms were associated with the alimentary canal. Of these, a diagnosis was made in 323 cases, whilst in the remaining 102 where a provisional diagnosis may have been attempted, the symptoms alone were treated. It is inevitable that there must be a great number of cases of irritation of the alimentary canal in which it is impossible to ascertain the cause positively. Fortunately by controlling the animal's diet and treating the symptoms as they arise, the great majority speedily recover.

Cases in which one has been able to make a definite diagnosis roughly divide themselves under three headings:—

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1. Conditions occurring in young animals, and by this I mean animals under 12 months.
2. Traumatic conditions, which may be encountered in animals of all ages.
3. Conditions occurring in animals past middle life, that is five years and above.

I hasten to say that this division of cases is by no means hard and fast.

Under group 1 the following are included:—

(*a*) Distemper.
(*b*) Parasites.
(*c*) Dietetic errors, mechanical causes, etc.
(*d*) Intussusception and volvulus.

Group 3 is best divided under two sub-headings:—

(A) Diseases of sudden onset, and in this is included:—

(*a*) The so-called hæmorrhagic gastro-enteritis.
(*b*) Poisoning by chemical irritants.
(*c*) Acute and sub-acute nephritis.
(*d*) Toxic hepatitis.
(*e*) Peritonitis.
(*f*) Pyometra.
(*g*) Obstruction of the colon and rectum.
(*h*) Diseases of the bladder.

(B) Diseases of insidious onset:—

(*a*) Chronic dyspepsia.
(*b*) Ulcerative conditions of the stomach.
(*c*) Stenosis.
(*d*) Neoplasms.
(*e*) Degenerations of the liver.
(*f*) Chronic inflammatory conditions of the small intestine, colon and rectum.
(*g*) Chronic nephritis.

I have no doubt that many of you have in your minds other conditions; the above, however, is a classification of the cases which have been brought to my notice during the period under review. The number of words at my disposal prevents my making more than a passing reference to some of these.

History of the Case.—The first consideration when examining an animal is the history of the case. It is a matter of the utmost importance, for in many cases this gives one more information than the actual handling of the animal. It should be ascertained by careful and systematic questioning of the attendant. One frequently finds that he, or she, is far more eager to speak of what has been done, rather than of that which has been observed.

I would suggest the following points:—

(*a*) The animal's age.
(*b*) History of previous illnesses, particularly distemper. History of any previous operation, particularly the removal of neoplasms.
(*c*) Duration of present illness, and if of sudden or insidious onset.
(*d*) Appetite.
(*e*) Emesis, nature of vomit, frequency, relation it bears to ingestion of food.
(*f*) Thirst.
(*g*) Nature and frequency of defæcation. Whether or not defæcation is accompanied by straining.
(*h*) Whether bright or listless.
(*i*) Loss of flesh, whether rapid or gradual.
(*j*) Frequency of urination—presence of blood.
(*k*) If a female, whether parous or not. The date of last œstrum.

Examination of the Patient:—

(*a*) Temperature; pulse and respirations of animal at rest. One lays particular stress on the words "at rest." An animal which is excited, or has been exercised previous to examination, frequently exhibits a rise in temperature.
(*b*) Auscultate the heart, paying particular attention to evidence of hypertrophy and dilatation.
(*c*) Apply the "meat test" if obstruction is suspected.
(*d*) Examine mouth, teeth and pharynx.
(*e*) Carefully palpate the abdomen, bearing in mind the following:—
Tenseness of abdominal musculature.
Epigastrium, duodenal and ileo-cæcal regions.
Margins of the liver.
Small intestines and the mesenteric glands.
Spleen.
Kidneys.
Colon.
Bladder.
(*f*) Rectal examination:—
Rectum and colon.
Prostate, bladder, and small intestine.
Uterine cervix, body and, if possible, bifurcation and posterior parts or cornua.

Examination of Urine.—An examination cannot be complete, and in many cases an accurate diagnosis cannot be arrived at, without an examination of the patient's urine. Kidney disease being of such common occurrence in the dog, it is essential that disease of this organ shall be eliminated before attempting to ascribe a cause to what are otherwise obviously alimentary symptoms.

(Collection is sometimes difficult, although, when requested to do so, the attendant can usually catch some of the urine in a bowl in the morning prior to examination.)

If the animal's bladder is comparatively full at the time of examination, we find it an easy matter to provoke urination by first exposing the penis and then exerting firm, continuous pressure on the fundus of the bladder through the abdominal wall. (At no time do we attempt to catheterise a dog merely for the collection of urine. The difficulty of sterilising the ordinary gum-elastic catheter is great, and on two occasions a fatal cystitis has arisen from the use of the catheter.)

Having obtained a sample of the animal's urine, the following tests should be carried out. In all cases the tests are simple; they do not necessitate elaborate apparatus, and they can be carried out by the practitioner.

(*a*) Specific gravity and reaction.
(*b*) Albumen. By boiling.
By Heller's nitric acid ring test.
By the salicyl-sulphonic acid test.
(*c*) Sugar. Fehling's test.
(*d*) Bile. Bile salt—Hay's sulphur test.
Bile pigment—Gmelin's nitric acid ring test.
—the iodine test.
(*e*) Indican. The chloroform test.
(*f*) Finally centrifuge and examine deposit microscopically for crystals, cells and tube casts.

Fæcal Examination.

(*a*) Ascaris ova. Sheather's sugar flotation test.
(*b*) Mucus.

Radiographical Examination.—I propose saying only a very few words on the value of radiography as an aid to the diagnosis of disease of the alimentary canal. It is still a luxury as far as most of our patients are concerned, and it is for this reason that I am confining the greater part of my remarks to the ordinary clinical aids to diagnosis. So far, most of the efforts of veterinary radiologists have been directed towards the demonstration in a skiagraph of foreign bodies, and the shadows shown by stones, pennies, needles, etc., are very spectacular. I feel, however, that a great field must lie in the outlining of the alimentary canal in a radiograph by the use of an opaque meal such as barium sulphate. In the human subject its value is well recognised. My experience is that a great number of the ordinary skiagraphs of the abdomen are valueless, and for this reason during the past few months I have, with the aid of Mr. H. J. Ede, the Radiographer at the College, endeavoured to make myself familiar with the abdomen of the dog as outlined by barium. As yet one is still a beginner in this branch of diagnosis, but I have a few pictures in which, by taking advantage of this method, an accurate diagnosis has been arrived at.

I propose submitting a number of these radiographs for your inspection.

. . . . .

Distemper.—Vomiting and diarrhœa are very common symptoms in the early phases of distemper: in fact, they are usually the first indications of the disease. A marked rise in temperature is helpful in making one's diagnosis. It is, however, not constant, and I can recall a number of cases, particularly in puppies under six months, in which a persistent diarrhœa with a loss of appetite were the only symptoms, but which ultimately ended in typical nervous distemper a month to six weeks later. Vomiting usually abates early in the attack, but a catarrhal enteritis persists. The thermometer is little or no guide as to the course the disease is taking, and one is entirely in the dark as to prognosis for at least several months after the apparent termination of the disease. The small intestine being the seat of a catarrhal inflammation, defæcation is frequent, and fæces are of the consistence of cream. Colour varies from yellow to black, often blood-tinged due to straining. In the later stages one's diagnosis is usually established by the onset of catarrh of other organs, particularly the conjunctiva, nostrils and bronchi.

Persistent diarrhœa, the result of a chronic enteritis, is a very common sequel to this disease. Loss of flesh is rapid and debility is marked.

Parasites.—Infestation by ascarides is a common cause of disease in young dogs. It is essentially a disease of the very young and death from a gross infestation occurs in animals from 5 weeks to 3½ months of age. In animals over this age the disease is rarely fatal. The chief symptoms are those of a catarrhal enteritis associated with debility, and a pot-bellied appearance of the abdomen. A positive diagnosis can be made by the detection of the parasites themselves or of ova in the fæces. The symptoms may arise from actual starvation of the host as a result of the gross infestation, from obstruction of the bowel or from toxæmia. One has, on several occasions, found on *post-mortem* examination of puppies between six and eight weeks old, a very extensive fatty degeneration of the liver, the cause of which was ascribed to gross infestation with ascarides.

It must be borne in mind that parasitic infestation and distemper may co-exist. The temperature may serve as a guide to differential diagnosis, as also may the animal's general disposition. With worms alone the appetite usually remains good and the puppy is fairly bright. Prognosis becomes entirely changed if distemper is present.

Dietetic Errors. — It is a remarkable fact that a large number of dog owners attribute most of the dog tribe's ills to feeding on those two very essential articles

of food—meat and milk, and for this reason they are rigidly excluded from the diet. One frequently encounters puppies suffering from debility, a muco-enteritis, often associated with rachitis, the cause of which I ascribe to an inadequate diet since weaning. Often the condition is associated with an extensive dermatitis of the vesico-pustular type. A rational diet quickly corrects the disease, although if rickets is advanced there may be permanent deformity.

Intussusception.—My experience of this condition has been confined chiefly to young animals, and in the year to six cases. Five have occurred in puppies between three and four months, whilst the other was in a seven-year-old male. In four of the puppy cases the invagination was of the ileum, through the ileo-cæcal valve, into the colon, in two there being extra anal protrusion. In the remaining two the invagination occurred in the jejunum; in the puppy it was two feet long and extended to within four inches of the anus, and in the other, the aged dog, it was six inches long.

From a diagnostic standpoint cases divide themselves into two groups, those in which there is extra-anal protrusion and those in which there is not. In the former group diagnosis is simple. The condition can be distinguished at a glance from prolapse of the rectum. An intussusception occurs as a turgid, cylindrical mass, having a diameter of four thicknesses of bowel wall. I lay stress upon the points turgid and cylindrical. A further point of diagnosis, of course, is that a sound can be introduced into the rectum between it and the invaginated portion.

In the case of a rectal prolapse the protruded portion appears as a spherical, rose-like mass, on which the wrinkling of the rectal mucosa can be easily seen.

One's chief difficulty arises in those cases in which there is no extra-anal protrusion.

The condition is of sudden onset and rapidly becomes progressive. Profuse vomiting is an early symptom, to be followed a little later by a mucus diarrhœa. The temperature is usually raised 1-2 degrees, and not infrequently both vomit and fæces contain blood. Appetite is in abeyance. Such a history in a puppy should always be followed by a careful abdominal palpation. The ileo-cæcal valve in the dog is in the epigastrium, an inch or two in front of the umbilicus and a little to the right of the middle line. A sausage-shaped enlargement, commencing in this position and extending backwards is highly suspicious of an intussusception—it is not, however, invariable. It may be enlargement of the ileo-cæcal lymphatic gland, it may be obstruction by a foreign body, or it may be colonic impaction. A rectal examination is of great assistance in establishing a diagnosis. The enlargement is usually of sufficient size to eliminate a lymphadenitis (in aged animals neoplasm formation in this gland must be borne in mind) or a foreign body. Per rectum, the finger can often touch the end of the invagination, whilst in cases of colonic impaction beyond the reach of the finger, the introduction of a stout, gum-elastic catheter into the mass, is a useful aid to diagnosis. It is essential, if surgical interference is to be successful, that a diagnosis should be made early.

The onset of necrosis, which rapidly occurs in canine subjects, causes death from peritonitis and toxæmia.

A point which arises is the cause of the condition. I have found that intussusception is liable to follow any inflammatory condition of the small intestine, particularly if there is spasmodic gut contraction associated with tympany. It may accompany the catarrhal enteritis associated with dietetic errors, distemper, infestation with ascaridæ, or with chronic enteritis in mature animals.

One must not assume on finding an intussusception at a *post-mortem* examination that it has been the cause of the illness one has been called upon to treat; it is more likely to be the effect, and whilst it was the immediate cause of death, that it only occurred a few days before.

The following cases illustrate this point:—

No. 1,831. March, 1932.

Subject.—10-weeks-old greyhound male puppy.

History.—March 10th. The animal has been suffering from diarrhœa with a poor appetite since purchase, seven days ago. Ascaridæ have been seen. Examination reveals marked debility and rachitis Temp. 101·2°

Treatment was given and the diet corrected. It was re-inspected on March 14th, 18th and 23rd, during which time there was a great improvement. The diarrhœa ceased, the appetite became ravenous, and growth was rapid. As a few ascarids were still being voided a vermifuge was again prescribed.

On April 6th, the puppy was again presented with the history that it had been ill for the past six days. An early symptom had been vomiting, but during the past 48 hours everything eaten was promptly returned. The puppy is fairly bright, the temperature is normal, and it is ravenously hungry. The œsophagus is clear and abdominal palpation reveals considerable tympany, but no evidence of a foreign body or of an intussusception.

On the following day 2 ounces of a barium sulphate emulsion was given and several radiographs taken. Nothing definite could be recognised, and it was decided to do an exploratory laparotomy.

This was carried out the same day. The alimentary canal from the stomach to the terminal portion of the colon was carefully examined, and, but for considerable tympany of the jejunum, nothing abnormal could be found.

For five days following the operation the puppy made good progress, all liquids were retained and only occasional vomiting of solids occurred.

The operation in no way affected the puppy adversely.

On the sixth day, vomiting became almost continous, the dog became acutely ill and death occurred in 24 hours.

Post-mortem examination (carried out in my absence) revealed intussusception of the ileum. The invagination was two feet long, and extended into the colon to within four inches of the anus.

Unfortunately the lumen of the bowel was not examined. No doubt changes associated with the intussusception would have masked lesions which were present before its occurrence.

No. 18. April, 1932.

Subject.—Seven-year-old spaniel male.

History.—April 1st. The dog has been ill for the past 10 days, the onset being sudden. Complete inappentence, vomiting two or three times daily—yellow froth. No excessive thirst, no diarrhœa. There is a considerable loss of flesh. Examination reveals nothing other than a little pain in the region of the epigastrium. Temperature normal.

Urine examination is negative for albumen, sugar and bile. Diagnosis postponed.

April 4th. The owner reports some progress; the appetite is still poor, but sickness is in abeyance. Urine is again examined with a negative result. A careful abdominal palpation revealed nothing nor did a radiograph under barium. A tentative diagnosis of hepatitis was made.

April 5th. Dog again presented with history that it was very much worse. Vomiting is almost continuous, it craves for water. Profuse diarrhœa. Temperature at time of examination 102·5°.

Death occurred in 24 hours.

Post-mortem examination, by Dr. Hare. Intussusception of the jejunum six inches in length, commencing three feet from the pylorus. There was a pronounced albuminous degeneration of the liver. Death was due to acute toxæmia arising from necrosis of the intussusception.

One is frequently called upon to attend a dog in which the predominant symptom is the sudden onset of acute vomiting. It may or may not be associated with inappetence. Such a trend of symptoms can be ascribed to a variety of causes, but it requires a very careful clinical examination to establish a correct diagnosis. The condition may be of no great concern; it may, however, be extremely serious.

It often necessitates a very careful questioning of the owner to ensure that the condition was of explosive onset and that it was not preceded by a period of listlessness and malaise. The latter history usually indicates some inflammatory condition of the alimentary canal, the kidneys, the liver, or the uterus.

In the early stages of an obstruction the appetite is usually maintained, the animal is often ravenous. The ingestion of food, however, usually causes prompt emesis. As to how rapidly this emesis occurs, after the ingestion of food, will depend to a great degree upon the seat of the obstruction, and upon the extent of the changes which have occurred in the wall of the tube.

The three common seats of obstruction are:—the œsophagus, the jejunum, and the colon. In the last case the obstruction usually comprises a mass of hard fæces surrounding a nucleus of undigested bone.

It is of interest to note that œsophageal obstruction is almost invariably caused by an irregular piece of bone. Smooth objects, although much larger, usually pass into the stomach eventually to cause obstruction of the small intestine. A foreign body may remain lodged in the greater curvature of the stomach for a long period without causing graver symptoms than those of a chronic indigestion; yet such a case may end fatally as the result of its suddenly passing through the pylorus and setting up complete obstruction of the small intestine. Questions which arise are:—what size foreign body can be expected to pass through the alimentary canal safely, and how long does this passage take? Does its passage give rise to symptoms? The answer to the first is indefinite; it may take 12 hours, it may take three or four days. If it passes along the small intestine slowly, it usually gives rise to symptoms of vomiting. As to size, here again one must be indefinite. Whilst I have seen a plum-stone cause a fatal obstruction in a Pekingese, I know of a Sealyham which passed a rubber ball 1½ inches in diameter. In a dog of 20-lbs. a foreign body of 1-in. in diameter usually causes complete obstruction.

One has first to satisfy oneself that the intrathoracic œsophagus is not the seat of obstruction (I lay considerable stress on this, for it is my experience that this is the commonest seat of obstruction in the dog). To do this I first apply what is called " the meat test." It is considered of greater diagnostic value than the passage of the probang; it is also less dangerous. The animal is forced to swallow three or four pieces of cooked meat (the pieces are about the size of a hazel nut). Immediately after swallowing the animal is watched carefully. In cases of œsophageal obstruction the attitude is characteristic. A succession of gulping movements, during which the chin is usually drawn towards the presternal cartilage, is speedily followed, in two or three minutes, by regurgitation of the meat, sometimes with a little blood. Not infrequently the animal will attempt to eat the meat again, and the symptoms are repeated. Such behaviour should be followed by deep narcotisation or even anæsthetisation of the subject, and a careful exploration of the œsophagus made, using a stout vulcanite sound. Morphine should not be used. One has seen the forcible vomiting to which this drug gives rise cause death from asphyxia in this condition. As yet I have not used the œsophagoscope for the diagnosis of this condition.

If radiography is available a positive diagnosis can be quickly arrived at; although I

would state that results are much more certain if barium sulphate is utilised. This collects on the piece of bone and gives a very dense shadow. Obstruction of the intrathoracic œsophagus occurs in two places, one being immediately over the heart and the other just in front of the diaphragm. The majority of my cases have been in the former position.

In the case of obstruction of the small intestine the symptoms are not so definite. Vomiting is invariable; the appetite, however, is frequently lost. In the early stages—and by this I mean up to 24 hours—the temperature may remain normal and the animal remain bright. Later the animal becomes dull, temperature rises 2-4 degrees and abdominal discomfort and pain are evident. Thirst will be increased, cool places will be sought, and the animal will frequently stretch itself, often for long periods, with the fore limbs extended, the head held low, the back arched and the pelvis held high. The onset of necrosis and peritonitis is indicated by acute abdominal pain, a temperature of 105° or even higher, and almost constant vomiting.

A careful abdominal palpation is necessary to make a positive diagnosis. In the dog, provided the animal is not very large or grossly fat, the whole of the small intestine and colon can be palpated through the abdominal wall with the exception of the first few inches of the duodenum. A foreign body lodged in the small intestine is typified by its mobility, and for this reason I lay stress upon the words "careful palpation." It may be pushed forward to disappear in front of the costal arch or backwards into the pelvis. One's diagnosis can frequently be confirmed by actually touching the body with the index finger inserted in the rectum, at the same time pushing the abdominal contents backwards with the other hand.

Conditions to be differentiated are enlargements of the mesenteric glands (these are situated higher in the abdomen); a pendulous kidney (situated higher still and even less mobile); stone in the bladder: this condition can be positively diagnosed by rectal palpation.

Impaction of the colon with fæces gives rise to symptoms of vomiting when it has been present for 48 hours or more. Abdominal palpation reveals the enlargement. It may be mistaken for a cystic calculus, for straining is an invariable symptom. It is quite easy to miss the condition even after a rectal examination, as the obstructed mass is often six inches or more in front of the rectum, often in front of an enlarged prostate gland.

I would sum up the question of bowel obstruction by saying that it can be positively ascertained in dogs of a reasonable size by a systematic palpation of the abdomen.

No. 1,013. November, 1931.

Œsophageal obstruction.

Subject.—Aberdeen terrier male.

History.—The animal has been ill for the past month. It was of sudden onset and the predominant symptom comprises the prompt vomition of all solids. Liquids are retained. The case has been under treatment elsewhere as one of distemper.

Examination.—There is great emaciation, although the puppy remains fairly bright. It is ravenously hungry and promptly bolts pieces of meat placed before it. This gives rise to the typical symptoms of œsophageal obstruction, and the meat is promptly returned with a little blood. The puppy is narcotised (avertin per rectum) and the obstruction located in the intrathoracic œsophagus immediately over the heart. Presternal œsophagotomy was performed and an irregular piece of bone removed. Recovery uneventful.

No. 154. March, 1932.

Subject.—Sixteen-months-old Airedale bitch.

History.—Illness of sudden onset commenced three days ago. Appetite at first fair, but now completely lost. Vomiting, which is becoming very frequent. Excessive thirst. Drinking almost immediately followed by vomiting. Frequently stretching. Pulse 210. Temperature 102·4°.

Abdominal palpation reveals a foreign body high up in the abdomen—colon.

Enemata enabled the removal of a playing alley (25 mm.—1 inch in diameter) by the rectum. Recovery uneventful.

Diseases of Sudden Onset.—I am frequently confronted with a case of an adult dog, in which the chief symptoms of illness are dulness, complete inappetence and frequent vomiting. When the case is advanced, there is often acute toxæmia with marked prostration. Such a condition may be met with in an adult dog of any age.

One's first duty is to rule out obstruction of the bowel—particularly cases of obstructing foreign body and intussusception—by a careful abdominal palpation. In the cases to which I refer, abdominal palpation reveals nothing.

On reviewing my cases, I find that such a history, whilst common, is only very seldom attributable to disease of the alimentary canal. It is one of the other organs of the abdomen which is affected. Of these I find that the kidney is the most common; others being the liver, the lymphatic glands, and, in the female, the uterus and the bladder.

Acute and Sub-Acute Nephritis.—This condition may be seen in adult dogs of both sexes. It is usually of sudden onset and early symptoms comprise dulness and listlessness, an almost complete loss of appetite, and an excessive thirst. Vomiting commences in the course of a few days and is usually profuse. A rise in temperature of 1 to 3 degrees may be present in the early stages, but later, and particularly with the onset of uræmia, it becomes sub-normal. An examination of the animal's urine should

always be made, for without it accurate diagnosis is impossible. Specific gravity is often raised and may be as high as 1050, but if the animal has been allowed access to water, it may be low—1005. Albumen is plentiful and, after centrifugalisation, cells and casts can readily be recognised under the microscope. They are usually finely granular, although epithelial casts from the convoluted tubules may be recognised. The mouth becomes fœtid and frequently necrosis of the mucosa of the cheeks and tongue may be seen; in fact, the case may become typical of the so-called "Stuttgart disease."

Acute uræmia is manifested by a staggering gait and locomotor inco-ordination, often culminating in clonic convulsions. Vomit becomes blood-tinged due to congestion of the gastric mucosa and towards the end the animal may vomit what appears to be pure blood. Death is preceded by delirium and paralysis.

Not infrequently hepatitis supervenes, the visible mucous membranes and the skin may become icteric, and bile salts and pigment may be detected in the urine.

The course of the disease varies; recovery may occur, but it is by no means the rule. In peracute cases death may occur in three or four days, whilst in subacute cases the condition may last for a month.

The clinical aspect of the condition is rather different from that of chronic cirrhosis of the kidneys so common in old dogs. In the latter condition the onset is much more insidious, and the course is more protracted.

Case No. 35. April, 1932.

Subject.—Four-year-old Pomeranian Male.

History.—April 2nd. The dog has been ill for seven days. Symptoms commenced with malaise and a poor appetite. For the past three days there has been complete inappetence, thirst and frequent vomiting. No diarrhœa.

Examination reveals the animal to be in a state of acute toxæmia. Pulse 100 (soft). Temperature 98·8°.

Urine 1012.
Albumen xxx
Bile x
Sugar —
Deposit — Many casts, epithelial and granular.

Diagnosis.—Acute nephritis.

Formalin was administered intravenously, which caused a little temporary improvement. 48 hours later collapse set in and the dog was destroyed.

Post-mortem examination (Professor Hare): Primary acute toxic nephritis (nephrosis) with secondary hæmorrhages into the liver, lungs, stomach and small intestine. There was also an acute terminal enteritis of the last six inches of the ileum.

Case No. 1789. December, 1931.

Subject. — Eight-years-old mongrel bitch. Maiden.

History.—Has been ill for six days. Prominent symptoms—vomiting, particularly froth, after drinking water. Craving for water. Has had similar attacks before, but they have rapidly cleared up. Considerable loss of flesh, fairly bright. *Examination*: Temperature 102°. Abdominal palpation—uterus and bladder normal, no pain.

Tentative diagnosis.—Some subacute inflammatory condition of the stomach and duodenum.

Four days later the owner reported improvement under treatment, vomiting in abeyance, but appetite still poor.

Urine Examination:—
Spec. Gr. 1005. Reaction acid.
Albumen xx. Sugar —
Deposit—a few granular casts.

Diagnosis.—Subacute nephritis, probably a "flare up" of the chronic form. Treatment was continued for the next ten days, during which time the animal was up and down, when collapse and acute uræmia set in. Temperature 99·8°. A fœtid stomatitis (Stuttgart disease). Later locomotor inco-ordination was followed by partial paralysis, delirium and death.

Post-mortem (Professor Hare): Primary chronic nephritis culminating in acute uræmia, manifested by ulceration of the tongue and multiple erosions of the mucosa of the fundus of the stomach.

Case No. 1727. November, 1931.

Subject.—Two-years-old Wire Terrier; male.

History.—Has been off colour for three weeks. Listless, appetite variable, occasional vomiting, some loss of flesh.

For the past three days complete inappetence, intense dulness, craving for water, and drinking promptly followed by vomiting. *Examination.*—Considerable toxæmia. Temperature 100°. Pulse 120. Mouth fœtid, some necrosis of the cheeks (clinical Stuttgart disease).

Previous history: no distemper.

Urine Examination:—
Spec. Gr. 1010. Reaction acid.
Albumen xxx. Sugar —
Deposit—Casts, epithelial and granular, spermatozoa.

Diagnosis.—Acute nephritis.

This case was treated by the intravenous injection of formalin. This gave rise to a spectacular temporary recovery. For four days sickness was in abeyance, the appetite returned and the dog became fairly bright.

It was followed by acute uræmia, manifested by, first a radial paralysis of the left fore leg, followed in 24 hours by inco-ordination, delirium and death.

Post-mortem.—Acute nephritis.

Case No. 1974. December, 1931.

Subject.—Twelve-months-old Terrier; male.

History.—Animal treated for distemper three months ago; the attack was not a severe one and the dog quickly recovered. For seven days the dog has been ill. Dull and listless, disinclined to move, appetite poor, frequent vomiting. Temperature 100°. No diagnosis made.

During the following week there was some improvement under treatment, the vomiting ceased, but the appetite remained poor. Temperature 101·8°.

Urine Examination:—
Spec. Gr. 1010. Reaction acid.
Albumen x. Sugar —

A further 14 days elapsed, but there was no definite improvement. Excessive thirst, inappetence and dulness persisting. In view of the animal's age, tuberculosis was suspected.

A month after the animal was first seen, the case became typical of the so-called Stuttgart disease. Marked toxæmia, necrosis of the tongue, inco-ordination followed by delirium.

Urine Examination:—
Albumen xxx. Casts, epithelial and granular.
Sugar—Negative.

Post-mortem Examination.—Extensive parenchymatous nephritis, some hepatitis, congestion of the mucosa of the pylorus and duodenum.

The Liver.—Diseases of the liver may give rise to a very similar trend of symptoms; in fact, clinically they may be indistinguishable, and it is only upon a urinary (and perhaps a blood) examination that one is able to make a positive diagnosis. Many of the cases of acute toxæmia which we meet, are cases of acute hepatitis. Many of them recover. Recovery, however, may be only temporary and extensive liver changes are often the ultimate cause of the animal's death. One is surprised, on making a *post-mortem* examination of these cases, at the enormous amount of liver tissue diseased, and yet death was preceded by a few days' illness only. In acute cases the onset of the symptoms is sudden; inappetence, dulness, vomiting, and toxæmia are prominent. Thirst may be increased, but this symptom is not so marked or so regular as with kidney disease. Jaundice may be present, but in our dog subjects is by no means invariable. In the early stages there is constipation, but later diarrhœa usually supervenes. This is due to putrefactive changes occurring in the gut. Not infrequently small pin-point hæmorrhages under the mucosa of the gums can be seen.

Urine examination reveals the presence of bile and often putrefactive products such as indican and potassium scatoxyl sulphate. Temperature and pulse indicate little or nothing; in fact, a sub-normal temperature is usually encountered.

Where the condition is of long standing or where the liver is the seat of extensive cirrhotic or hæmorrhagic changes, or where there is extensive neoplasia of that organ, the course is usually more chronic and enlargement of the liver can usually be detected by palpation. Secondary changes can be detected in the heart, and œdema of the abdomen and chest is frequent.

One might mention here that disease of the liver is rather more common in the female than in the male. Hepatitis is followed by extensive hæmorrhagic degeneration associated with considerable enlargement of the organ, and is commonly met with in the aged bitch.

We place great reliance on urinary examination for the diagnosis of liver disease. The Van den Burgh test of the blood is more reliable, but the collection of 5 c.cs. or more blood from our patients is not always an easy procedure, and I do not think the test will appeal to practitioners.

Case No. 9930. May, 1931.

Subject.—8½-years-old Brown Mongrel Bitch.

History.—For the past two years the animal has been treated for a suppurative otitis of the right external ear.

May 11th, 1931. For the past three days the bitch has been ill.

Symptoms.—Listlessness, complete inappetence, excessive thirst, immediately followed by vomiting.

Examination reveals acute toxæmia. Temperature 100°. Pulse 90—soft. Abdominal palpation reveals pain in the epigastrium. Rectal examination—uterus and bladder normal. No icterus. A tentative diagnosis of acute hepatitis was made, the chronic septic focus in the ear being considered the cause. Formalin was administered intravenously.

The animal made a striking and rapid recovery and remained fit and well until the end of April, 1932, when there was a recurrence of similar symptoms. There was still no visible icterus, but as a greatly enlarged liver could be palpated per abdomen, the dog was destroyed.

Post-mortem Examination (Professor Hare): The liver was very fatty, enlarged and faintly jaundiced, and thickly studded with areas of regenerating parenchyma.

(Professor Hare's report also describes the lesion of the ear, and also a dystrophia adiposo-genitalis due to an adenoma of the pituitary gland).

Case No. 848. April, 1932.

Subject.—Six-years-old male Wire Terrier.

History.—April 22nd. Has been ill for about a week. Appetite poor, great thirst, vomiting food and froth. Is still fairly bright. Some loss of flesh about the lumbar region. In owner's possession since a puppy, and this is first illness. Temperature 101°. Pulse 130.

April 28th. Some improvement, sickness in abeyance, but appetite still poor, and thirst great.

Abdominal palpation reveals enlargement in the region of the liver on the right side. No icterus, no œdema. Temperature 101°.

Urine Examination:—

Spec. Gr. 1002.	Reaction acid.
Sugar —	Indican x.
Bile xx	Albumen —

Diagnosis.—Subacute hepatitis, with hæmorrhagic degeneration. April 29th. Considerably worse. Complete inappetence, frequent vomiting, intense dulness. Temperature 100°. Icterus of skin and mucosa.

Van den Burgh's test, blood serum—biphasic reaction. Dog destroyed.

Post-mortem Examination.—Liver yellow, gall bladder distended. Large neoplasm arising from the right lobe of the liver and surrounding the duodenum, undergoing degenerative changes. Multiple pin-head secondaries in the omentum.

Case No. 15. November, 1931.

Subject. — Ten-months-old Mongrel; male; 15-lb.

History.—November 21st. Illness of 48 hours. Malaise, inappetence, occasional sickness.

Temperature 103·5°. (As the case was thought to be distemper, Laidlaw-Dunkin concentrated distemper antibody was given).

On the following day the animal became rapidly worse. Temperature fell to 94. Pulse 120, small and weak. Frequent vomiting and a great thirst. Mucous membranes icteric, numerous small hæmorrhages into the gums.

Blood Examination.—Negative for leptospira, but gave a biphasic Van den Burgh reaction.

Urine Examination:—Positive for bile.

Diagnosis.—Acute toxic hepatitis, canine distemper infection suspected. The dog was destroyed.

Post-mortem revealed the liver to be yellow in colour. All the tissues were œdematous and extensive subperitoneal hæmorrhages were found.

Case No. 373. October, 1931.

Subject.—Eleven-weeks-old puppy; male.

History.—Has been ill for four days. Sudden in onset. Complete inappetence, excessive thirst, profuse vomiting. Some diarrhœa, fæces pasty, grey and blood tinged. No icterus. Temperature 102·8°. Pulse 160. Palpation reveals considerable tympany. A laparotomy revealed extensive hepatitis, and the animal was destroyed.

Post-mortem did not reveal any cause for the hepatitis.

Case No. 2,093. June, 1931.

Subject. — Six-years-old Airedale bitch; maiden.

History.—An illness of three weeks. Commenced with excessive thirst, later frequent vomiting. A rapid loss of flesh. Appetite poor, although the animal remains fairly bright. Abdominal palpation reveals nothing. Temperature 101°. Urine not available.

A week later the owner reports that there is no improvement. Appetite is completely gone, vomiting is frequent, emaciation marked.

Palpation reveals enlargement of the liver and pain on pressure. No icterus or œdema. Temperature still normal. The animal was destroyed and *post-mortem* revealed extensive hæmorrhagic breakdown of the liver tissue.

Case No. 2073. March, 1932.

Subject.—Five-years-old Mongrel, male; 30 lbs.

History.—Has been ill for the past four days. Of sudden onset. Intense dulness, appetite in abeyance, thirst increased, frequent vomiting—froth, diarrhœa, fæces black, fœtid and of the consistence of cream. Temperature 102°. Pulse 136. Mouth good, no icterus.

Urine Examination:—
Spec. Gr. 1014. Reaction acid.
Albumen faintly x. Sugar —
Bile xx. Indican x.

Diagnosis.—Subacute hepatitis with a secondary putrefactive diarrhœa.

This case recovered in ten days under treatment.

Pyometra.—A common disease of the maiden female is pyometra. I lay particular stress on the word "maiden," for it has been my experience that the condition to which I refer, *viz.*, distension of the uterine horns with pus without any marked thickening of the endometrium, invariably occurs in the maiden bitch. (One recognises a chronic endometritis which occurs in parous females. The course of the disease, however, is different, and prominent changes occur in the endometrium). Pyometra is essentially a disease of the middle aged and aged, although I have met the condition in an animal two years old.

It may be said that a purulent discharge from the vulva makes diagnosis simple, but my point is that the cervix uteri often remains closed to the end, or at any rate, until the animal is frequently *in extremis* and beyond surgical aid. It is a condition that must be diagnosed early.

The first symptoms observed are listlessness, appetite picksome, thirst somewhat increased and occasional bouts of vomiting. The temperature rises two to four degrees. Loss of flesh is usually rapid, and a pendulous condition of the abdomen may be discernible (occasionally abdominal distention becomes so great that the condition is mistaken for ascites). Distension, however, and particularly in fat bitches, is not a reliable symptom.

A very important point in the history of the case is a recent œstral period. I am convinced that infection occurs during œstrum and symptoms are always observable within a month or so after its cessation. If the bitch has not been in season for four months or more, one may rest assured the case is not one of pyometra.

Toxæmia is marked. Abdominal palpation is quite unreliable as the distended uterine horns offer little or no resistance to the fingers.

Rectal examination is essential, but here I would urge a note of caution. The disease is essentially one involving the uterine cornua. The uterine body in the bitch is short (½ inch to 1 inch), but the vagina is very long and extends well into the abdominal cavity. I mention this because whilst the vagina and cervix, and even the posterior part of the body of the uterus may feel perfectly normal under the finger, enormous distension may be present from the bifurcation forwards. This distension of the horns may be readily felt in small bitches, but it may be an impossibility in large or very fat ones.

Case No. 1258. February, 1932.

Subject.—Four-years-old St. Bernard bitch; maiden.

History.—Has been ill for four days. Symptoms commenced with dulness and loss of appetite. Thirst is excessive and there is occasional vomiting. Last œstrum ended four weeks ago. A vulval discharge commenced five hours ago, and it is estimated that since then nearly a pint of pus has been voided. Temperature 105°.

Diagnosis.—Pyometra. Metrectomy performed.

Case No. 382. January, 1932.

Subject.—Nine-years-old fat Mongrel bitch of the Collie type; maiden.

History.—For the past seven days almost complete inappetence, dull, shivers a great deal. Excessive thirst but no sickness. Temperature 102·2°. Previous œstrum ended five weeks ago. Animal too fat for accurate rectal examination. No vulval discharge.

Diagnosis.—Pyometra, laparotomy confirms diagnosis. Metrectomy performed.

Diseases of the Bladder.—By far the commonest disease of the bladder which we encounter is calculus formation. In the male the presence of obstructive calculi in the urethra gives rise to such an obvious train of symptoms that it

is unlikely that the focus of the disease will be confused with the alimentary canal.

In the female, however, one has on a number of occasions met cases of cystitis, secondary to cystic calculus, in which the predominant symptoms have been those of inappetence and occasional vomiting, together with a rise in temperature, and it has only been as the result of drawing the attention of the owner to the fact, that he recollects urinary symptoms. For the accurate diagnosis of vesical calculus, it is essential that a rectal examination be made. Abdominal palpation and even radiography are insufficient. One has on a number of occasions met cases of impaction of the colon, in which the spherical mass lodged in the colon could not be distinguished from a cystic calculus by abdominal palpation only. In addition, the frequent straining and micturition to which both conditions give rise, further tend to cause confusion.

Case No. 38. January, 1931.

Subject. — Eight-years-old Mongrel bitch; maiden.

History.—For past seven days animal has been off food. Frequent vomiting, particularly after drinking. No excessive thirst. Previous œstrum some months ago.

Examination.—Temperature 104°. Rectal palpation reveals uterus normal, but presence of large mulberry stone in bladder. The case one of cystitis.

Case No. 775. May, 1931.

Subject. — Four-years-old Pekingese bitch; maiden.

History.—Complete inappetence for six days, some loss of flesh, no increased thirst. Profuse vomiting commenced 24 hours ago.

Examination.—Temperature 103·5°. Rectal palpation, uterus normal, but a cystic calculus the size of a golf ball. Cystitis.

I mention these two cases because in neither one did the owner draw attention to the fact that there was urinary disturbance; it was the alimentary symptoms which impressed them most.

Case No. 899. February 2nd, 1932.

Subject.—Eight-years-old Terrier bitch.

History.—Had one litter three years ago, last œstrum three months ago. The bitch was normal until four days ago, when she commenced straining, passing small quantities of urine. Appetite was at first normal, but for the past 24 hours completely lost. Frequent vomiting of froth, no thirst.

Abdominal palpation reveals a spherical enlargement the size of a golf ball in front of and beneath the pelvic brim.

Rectal examination reveals impaction of the rectum 5 inches in front of the ovus.

Remarks.—This case is of particular interest, for the history of the case together with an abdominal palpation only, might have led to a diagnosis of cystic calculus.

I do not propose to say anything on the subject of the so-called "Hæmorrhagic gastro-enteritis of Greyhounds" as my experience of the condition is insufficient. I would say, however, that in other breeds I find strong resemblances to the condition in that common disease —acute nephritis.

Poisoning by Chemical Irritants. — My opinion is that the poisoning of dogs by chemical irritants is a rare condition; in fact, in the cases I am reviewing none has been met. On a number of occasions a chemical analysis has been carried out in deference to the wishes of an owner who is convinced that the animal has been poisoned, but the results have always been negative.

Suspicion of a neighbour is particularly common amongst poor people living in flats and tenements; *post-mortem* examination of the animal, however, usually reveals a very natural cause for death.

CONDITIONS OF INSIDIOUS ONSET AND CHRONIC COURSE

This heading includes a variety of conditions of widely different sources. In this group the alimentary canal itself becomes incriminated. I find on reading text books on human medicine that the two commonest seats of disease of the alimentary tube in man are the commencement —the stomach, and the end—the colon. My experience with the dog leads me to believe that it is the middle—the small intestine—that is most often involved. I refer to the condition chronic enteritis so common in dogs of middle age. The symptoms are those of a persistent diarrhœa associated with a progressive loss of flesh. Vomiting is not a prominent symptom, but the appetite is poor and thirst is increased. The fæces are usually of the consistency of cream, and defæcation is accompanied by straining, and often small hæmorrhages. There is considerable putrefaction and tympany, and abdominal palpation is usually resented. One establishes one's diagnosis by a process of elimination. The urine is negative for albumen, bile and sugar, but is usually positive for indican and scatol. The disease is not associated with infestation with ascaridæ or tæniæ, and on *post-mortem* the chief findings are those of a streaky congestion of the mucosa of the small intestine extending from the duodenum to the ileum.

Gastric ulcer in the dog is a rare condition, although during the year I have met one case in which an ulcer ½ inch in diameter was present in the greater curvature, associated with chronic nephritis, so that confusion arises as to the specificity of the symptoms. It should be mentioned in this connection that recent ulcers in the stomach and intestine are sometimes found associated with uræmia in the later stages of chronic nephritis.

As regards stenosis, the cases I have encountered have been due to pressure from with-

out (generally lymphadenitis) and not to actual changes in the bowel wall, with the exception of neoplasm formation, and with this condition I propose to deal separately.

Neoplasms.—The abdomen of the dog is a very common seat of neoplasm formation in animals over five years of age (the condition is occasionally met in dogs of three and even two years). The commonest focus is the lymphatic glands, particularly the mesenteric and the ileo-cæcal, but tumours involving the wall of the tube are also frequent. When the glands are the seat of the disease the growth can assume enormous proportions before there are any marked symptoms. Not infrequently the mass surrounds a number of loops of the small intestine, but it is uncommon for it to involve the mucosa. The usual history attending such a case is a progressive loss of flesh extending over some months, the appetite is usually maintained and sickness is not prominent. Abdominal palpation immediately establishes one's diagnosis.

Of the intramural neoplasms, the *post-mortem* reports I have received from my colleague, Professor Hare, indicate that the lympho-sarcoma is the most frequent and that the small intestine is the commonest seat. Here again ulceration of the mucosa is not common. This is probably the reason that the growths can attain such a size without causing very obvious symptoms, although I have met cases in which death has been due to peritonitis consequent upon perforation of the bowel wall. The course of the intramural neoplasm is more rapid than that involving the glands alone, and I have no doubt that stenosis plays a part. Metastasis in the liver and consequent destruction of this organ is in part responsible for the symptoms. I feel that these are best indicated by describing a few cases:—

Case No. 2005. June, 1931.

Subject.—Seven-years-old Irish Terrier bitch.

History.—Parous. Previous œstrum six months ago. A slow but progressive loss of flesh for some months, the abdomen becoming pendulous. Still bright, appetite fair, occasional vomiting, no diarrhœa, or excessive thirst.

Examination.—Temperature 101°. Abdominal palpation reveals an enormous neoplasm (large cocoanut) involving the mesenteric glands. Advice to destroy disregarded and the animal taken away.

Case No. 2122. December, 1931.

Subject.—Eleven-years-old Terrier bitch.

History.—A progressive loss of flesh for the past two months, appetite poor but not entirely lost. Frequently vomits. No excessive thirst.

Examination.—Temperature 100·8°. Uterus normal, bladder normal; a sausage-shaped enlargement can be palpated high up in the epigastrium.

Diagnosis.—Neoplasm.

Post-mortem (Professor Hare): A large intramural lymphosarcoma of the duodenum. Two smaller sarcomata in the jejunum and a small metastasis in the right kidney.

Case No. 1910. December, 1931.

Subject.—Eleven-years-old Crossbred Setter; male.

History.—The dog has been ill for four weeks. Almost complete inappetence, profuse vomiting, some increased thirst. Rapid wasting. Six months ago an ulcerating neoplasm was removed from the skin of the face.

Examination.—Temperature 103·5°. Abdominal palpation resented, but no obvious enlargement detected. Urine not examined. A tentative diagnosis of metastatic neoplasms being made, the owner requested destruction.

Post-mortem (Professor Hare): Acute septic peritonitis the result of perforation of a round cell sarcoma of the duodenum. There were five separate intramural sarcomata of the small intestine.

I have already shown that the kidney is responsible for many of the acute cases of what appear to be gastro-enteritis, and when dealing with conditions of a chronic nature I find that this organ plays an even more important part.

Chronic contracted kidney in the dog is well recognised on *post-mortem* examination. It is our duty as clinicians to recognise the condition early and attempt to cure or at any rate alleviate it. The condition is usually met in an animal past middle life, from five years upwards, and it is far more common in the male than in the female. Not infrequently the dog is described by the owner as a "gastric case." In the early stages an increased thirst with occasional bouts of sickness are the only symptoms. The vomit seldom or never comprises food. It is usually white froth and follows excessive drinking. Not infrequently there will be bouts, of a few days' duration, of complete inappetence with sickness. Associated with these symptoms, there is a slow but progressive, loss of flesh. Sometimes there is a marked atrophy of the temporal and masseter muscles. This symptom, however, is seen in a number of diseases of the dog and I do not think it is characteristic of any particular one.

The increased work placed upon the heart produces changes in that organ. Hypertrophy of the left ventricle and an increased force of the cardiac impulse are recognisable. Not infrequently there is marked dilatation of the ventricle with a duplication of the first sound or systolic murmur due to mitral regurgitation. I have not yet found a satisfactory method of taking the blood pressure of the dog as a routine aid to diagnosis. Chronic congestion of the liver and of the abdominal viscera may give rise to diarrhœa. Œdema, however, is not a common accompaniment of chronic nephritis.

Such a condition may go on for years, to terminate ultimately in death from uræmia. Death is usually preceded by an acute illness. There is complete inappetence, craving for water, profuse vomiting, marked toxæmia with a

sub-normal temperature, culminating in locomotor inco-ordination, coma and death. As with acute nephritis death is frequently preceded by hæmatemesis and dysentery.

On a number of occasions I have met that condition of osteitis fibrosa of the maxillary bones—" rubber jaws," associated with chronic nephritis.

Any history similar to the one I have just described should be followed by an examination of the patient's urine. In chronic nephritis the specific gravity is low—1002 to 1005; it is light in colour, copious and its odour is negligible. Albumen is invariably present, but often only in small quantity. The amount of albumen detected bears no relation to the extent of the disease. It is, however, readily demonstrated by the nitric acid ring test, and by the salicylsulphonic acid test. Bile is usually absent, as also are indoxyl and scatoxyl compounds.

I do not think that provocative tests of renal efficiency, such as the urea concentration test, can be satisfactorily carried out in our animals under ordinary conditions of practice. We have to obtain the animal's urine as opportunity offers and certainly cannot command it at definite periods of time.

Case No. 1922. March, 1932.

Subject.—Ten-years-old Terrier; male.

History.—March 14th. Owner suspects the dog of having swallowed a stone four days previously. It was apparently normal until 48 hours ago, when symptoms of excessive thirst, followed by vomiting, occurred. The vomiting is now in abeyance, but the thirst persists. Appetite lost.

The dog is in good condition, although the owner recognises some loss of flesh during the past few months. Temperature 101°. No changes detected in the heart. Abdominal palpation reveals nothing abnormal, and radiography, both with and without barium, does not show a stone.

Urine Examination:—
Spec. Gr. 1005. Reaction acid.
Albumen xx.
Sugar, Bile and Indican—negative.

Diagnosis.—Chronic contracted kidney.

March 15th. 11 a.m.—No change.
9.30 p.m.—Very much worse, onset of acute uræmia indicated by locomotor inco-ordination and profuse vomiting. Commencing necrosis of the cheeks and tongue. Temperature 99°.

Formalin administered intravenously.

March 16th. 9 a.m.—*In extremis,* hæmatemesis and dysentery. Destroyed.

Post-mortem Examination (Professor Hare): Typical pale contracted kidney. Microscopically—a terminal acute necrosis of the epithelium and secretory tubules. Liver—a secondary acute toxic necrosis. Early erosions of the mucosa of the stomach. A solitary acute ulcer in the jejunum.

These finds are typical of the common form of uræmia supervening upon chronic nephritis.

Case No. 1218. May, 1932.

Subject.—Twelve-years-old Terrier; male.

History.—Has been losing flesh for the past month to six weeks.. More thirsty than normal and drinking is usually followed by vomiting. Still bright, but appetite variable. Coughs, particularly on exercise.

Examination.—Temperature 100·8°. Pulse 120. Systolic murmur, mitral regurgitation, no œdema.

Urine Examination:—
Spec. Gr. 1002. Reaction acid.
Albumen x. Sugar —
No deposit.

Diagnosis.—Extensive chronic nephritis, secondary heart changes, dilatation left ventricle, some hypertrophy.

Case No. 1,727. November, 1931.

Subject.—Ten-years-old Mongrel; male.

History.—A progressive wasting for the past six weeks, dulness, appetite poor, excessive thirst and frequent vomiting—froth.

Examination.—Marked emaciation. Temperature 100·6°. Abdominal palpation negative. Pulse 140, some lengthening of the first sound, dilatation and hypertrophy of the left ventricle.

Urine Examination:—
Spec. Gr. 1005.
Albumen xx. Sugar —
Deposit —

Diagnosis.—Chronic contracted kidney.

Post-mortem.—Confirms.

Chronic diarrhœa is a bugbear of canine practice. I myself recognise three different forms of diarrhœa in adult animals. The first is due to a chronic enteritis involving the jejunum particularly (I have already mentioned this condition); the second is a chronic colitis and the third is associated with inflamed conditions of the rectum and anus.

In the first condition, there is evidence of putrefaction, fæces are of the consistence of cream, brown to green in colour. Odour fœtid and defæcation is explosive due to the presence of gas. Frequently there is marked straining with the passage of blood. The animal is ill in itself, the appetite is variable, and at best, poor. There is a progressive loss of flesh and generally an increased thirst. The temperature is usually raised 1-2 degrees, and abdominal palpation causes pain and reveals tympany.

In the second condition, that is, a chronic colitis, whilst the fæces are diarrhœic and defæcation is frequent, the nature of the fæcal material is different. It comprises normal soft fæces mixed with mucus. It is brown in colour and has the normal fæcal odour. Straining is again a common feature and the passage of fæces is often followed by a few drops of blood. The temperature remains normal, the animals remain bright, the appetite is maintained and there is no marked loss of flesh.

The third condition, stricture of the rectum, is by no means uncommon. Defæcation is frequent, there is marked straining—the animal frequently screaming when passing small quantities of almost liquid fæces. I attribute the diarrhœic fæces to the fact that the mere presence of fæcal matter in the colon provokes straining and that little or no re-absorption of water occurs.

Case No. 988. May 3rd, 1932.

Subject.—Six-year-old Airedale bitch.

History.—May 3rd. Maiden; last œstrum ended three weeks ago. For the past six weeks the animal has been suffering from diarrhœa, the appetite is getting poorer and poorer, and there is some loss of flesh.

Fæces the consistence of cream, fœtid; at first grey in colour, now yellow. Defæcates three or four times during the day and there is some straining. Excessive thirst. Vomiting occurs occasionally, but is not a prominent symptom.

Examination.—Temperature 101·5°. Pulse 120, full.

Abdominal palpation—intestinal tympany, no obvious enlargement.

Rectal palpation—bladder and uterus normal.

Urine not yet available, medicine prescribed.

May 10th. No improvement. Still thirsty; appetite very poor, diarrhœa less frequent, fæces now black in colour. (Bi.)

Temperature 101·2°.

Urine. Spec. Gr. 1047. Acid.
Albumen and Sugar—Negative.
Bile x.
Indican xxx.

Diagnosis.—Chronic enteritis, some hepatitis.

The case was treated until May 21st. No improvement occurred and urine examination revealed indoxyl and scatoxyl compounds at each examination.

The animal was destroyed.

Autopsy (by Mr. A. B. Orr).—A chronic catarrhal inflammation of the duodenum and jejunum. The mucosa was velvety in appearance and thickened. Chronic passive congestion of the abdominal and thoracic viscera with a terminal dilatation of the right ventricle as a consequence of progressive heart failure.

Passing to the cat, I propose to make a few comparisons between the conditions we commonly encounter in this animal, as compared with those we have already touched upon in the dog.

In the kitten, the commonest form of disease of the alimentary canal is the so-called "infectious enteritis of cats." Clinicians are inclined to differentiate this disease from that of catarrhal fever of the cat usually called "feline distemper."

The disease to which I refer is highly infectious and usually occurs in animals of six months or under. The preliminary symptoms are the sudden onset of malaise and inappetence, with intense dulness. The temperature usually rises to 105 degrees or even higher, and a loss of flesh is extremely rapid. Alimentary symptoms usually develop late in the disease, *i.e.*, after three or four days. Vomiting may occur, but is by no means constant. The onset of acute toxæmia, together with a profuse diarrhœa, precede death by 24-48 hours. On *post-mortem* examination, lesions are chiefly confined to the duodenum and jejunum. They comprise generally a patchy congestion. Occasionally actual ulceration of the mucosa is observed.

Ascaridæ are encountered in the young kitten, but by no means so frequently as in the dog. Dietetic errors are rare, and one speculates that the rarity of rachitis in kittens may be due to feeding on milk.

Obstruction of the alimentary canal by a foreign body is rare in the cat. The cat does not attempt to swallow balls or large pieces of bone. The fish-bone is a common cause of trouble, but it is the throat which is involved. (This remark also applies to the needle.) Obstruction of the œsophagus, when it occurs, is more likely to be due to a malignant growth of the œsophagus, the following case being a record of one:—

No. 815. April 28th, 1932.

Subject.—Nine-years-old castrated male cat.

History.—The animal was in good health until about six weeks ago. It has been very fat for years. Illness commenced with a poor appetite and occasional bouts of vomiting. For the past two or three weeks it appears to have had considerable difficulty in swallowing. Liquids are retained but solids are quickly ejected. No thirst.

Examination.—Temperature 102°. Marked emaciation. Abdominal palpation is negative but for presence of fæces in colon.

Meat test.—Animal ravenous but meat promptly ejected. Cat recommences to eat it. Symptoms typical of an œsophageal obstruction.

Radiography. 1 oz. of barium sulphate emulsion given and a radiograph reveals a neoplasm of the œsophagus almost obliterating its lumen, the size of a hazel-nut and hanging from the first and third ribs.

Autopsy revealed a malignant growth of the œsophagus.

Impaction of the colon is, unfortunately, common in the cat. Not infrequently the impaction commences immediately behind the ileo-cæcal valve and may remain there as an egg-shaped mass, or the whole colon as far as the rectum may be distended with fæces.

The usual history attending such a case is that the cat has been off its food for several days, and is inclined to vomit, usually froth. The owner has usually prescribed castor oil which has provoked further vomiting. There may or may not be straining (one would mention here, incidentally, that by far the commonest cause of straining in the cat is obstruction of the urethra). Abdominal palpation reveals a mass varying in size from that of a walnut to that of a hen's egg when the obstruction is localised, or a sausage-shaped mass when the colon is involved, high up in the abdomen. It can quite easily be mistaken for a lymphadenitis or neoplasm; in fact, it may be necessary to introduce a catheter up the colon and into the mass to establish a diagnosis. Palpation of a distension the size of an orange is characteristic of urethral obstruction.

The condition I am discussing is more common in long-haired cats, and hair usually serves for binding the mass. The consistence of the mass is hard and cheesy, rather different from the concrete-like masses made up of bone and undigested biscuit material which

commonly form the impacted mass in the dog.

Neoplasms in the abdomen in the cat are as common as they are in the dog. The common seats are: the mesenteric lymphatic glands and the wall of the stomach and bowels themselves. The intramural neoplasm in the cat more frequently undergoes ulceration than it does in the dog.

The history attending such a case is an insidious loss of flesh, appetite poor—often completely lost. Not infrequently the animal is a skeleton when presented. Vomiting may occur but is not the rule as in the dog. A careful abdominal palpation quickly reveals the cause of the trouble—enlargement of the abdominal lymphatic glands. Many of these cases are diagnosed haphazardly as tuberculosis. My experience is that in the old cat new growth formation, and a lymphadenitis due to invasion by *B. coli*, are commoner forms of glandular enlargement than is tuberculosis.

As opposed to one's findings in the dog, the kidney is not a common seat of disease. In the cat, in fact, in the year under review I have only met two cases of chronic nephritis in this subject.

Disease of the liver, however, is more common in the cat than in the dog.

On *post-mortem* examination one finds varying degrees of hepatitis, from a cloudy swelling to an extensive fatty degeneration or cirrhosis. The latter condition is usually accompanied by ascites.

We meet a large number of cats past middle life, in which there is a history of disease of insidious onset and associated with a poor appetite, usually excessive thirst and perhaps occasional vomiting, but always a marked loss of flesh. This, when a more obvious cause cannot be detected, is usually due to disease of the liver. As has been mentioned, when cirrhosis is present, there is some œdema; in the case of tuberculous hepatitis, the organism can often be demonstrated in the transudate.

At this point I must cease, as the number of words suggested for the paper is already greatly exceeded. I have dealt with the subject in a very inadequate fashion, but the blame for this, whilst lying for the greater part with myself, must be shared by the Provisional Committee for setting me the task of writing a very short paper on a very large subject.

Acknowledgments.—I wish to acknowledge the help I have received from Professor Tom Hare, who has carried out a large number of *post-mortem* examinations for me; from my colleague Mr. J. H. N. Hobday, B.Sc., M.R.C.V.S., who has worked with me during this period; and to Mr. H. J. Ede, M.S.R., who has taken the radiographs and has made many suggestions regarding the use of barium sulphate as an aid to diagnosis.

Discussion

The discussion of this, the second paper to be presented to the Veterinary Medicine and Surgery Section, took place under the Chairmanship of the Vice-President of the Section, Professor G. H. Wooldridge, during the morning of Wednesday, August 9th.

The Chairman, in calling upon Major Chambers and Major Kirk to open the discussion, commented upon the encroachment upon the time of the session by that which had preceded it. Whatever advantages that might have presented to the earlier session concerned, observed the Chairman, there was no doubt that it possessed grave disadvantages in connection with the discussion of Professor Wright's paper, which many regarded as by far the most popular paper of the Congress. (Hear, hear.) He was compelled, therefore, to request speakers to be brief and to come to the point as quickly as possible.

He had much pleasure in calling upon Major Frank Chambers, who, with Major Hamilton Kirk, was to open the discussion.

Major Frank Chambers, O.B.E., F.R.C.V.S., Wolverhampton, said: I should like to take this opportunity of thanking the Local Committee for allowing me to open the discussion on what I deem the best paper that has been presented to the "National" for many years. I consider that, in the space allowed, Professor Wright has dealt with this vast subject in a masterly manner. When one considers that gastro-intestinal disorders of the dog constitute the vast majority of cases seen during the course of a day, one wonders why this subject has not been debated on before. The Provisional Committee are to be congratulated on their choice of the essayist. (Hear, hear.)

In dealing with cases of suspected foreign bodies in the stomach and intestines one has to contend with the natural objection of the dog to one's grasping the abdomen and the subsequent tensing of the abdominal muscles by the patient. If this difficulty presents itself no harm will be done by giving the animal a whiff of chloroform in order to make the examination easy and, as a consequence, the diagnosis more certain.

The great majority of cases of intussusception which occur in young animals are secondary to an attack of malignant jaundice and as a rule diagnosis is easy, for the sausage-shaped mass can readily be palpated. With this there is usually straining at frequent intervals and the passage of thin, blood-stained fæces. In an older dog the chance of a complete obstruction being due to intussusception is rather remote, but if the practitioner is certain in his own mind that a complete obstruction exists then I consider an exploratory laparotomy should be done with all speed. No harm will

be done by "having a look," but before commencing the operation every instrument that might be needed should be sterilised and ready for use. Many more lives would be saved if laparotomy was done in the early stages. The chance of recovery when one operates after the dog has been ailing for ten or more days is extremely slight.

It is remarkable what large objects will pass through the stomach into the intestines. The usual symptoms shown are loss of appetite, occasional vomition, no great thirst but depression and often fluctuating temperature. When the foreign body passes into the intestines and causes total obstruction the symptoms are more alarming. If it gets lodged in the small intestine there will be vomition of bile or even fæces. A fæcal vomit is absolutely indicative of a complete obstruction. When the foreign body arrives in the intestines it can usually be palpated, but I have had cases where I could not feel the obstruction, whereas an X-ray has revealed the trouble. If these cases are operated on immediately there should be a very large percentage of successes. If the obstruction has been some time in the one spot the intestinal wall is so damaged that unless the object can be moved lower down where the bowel is more healthy, there is every chance the animal will die. In these cases, even if the condition of the bowel wall is not in a state approaching gangrene, it is totally paralysed and may remain so for so long that the animal dies from shock or toxæmia.

The diagnosis of pyometra is not easy if the cervix is not patent and the contents of the uterus are not escaping through the vagina. If the discharges are escaping there is little constitutional disturbance. It is when the cervix is closed that grave symptoms present themselves. There is usually vomiting without great thirst, a fluctuating temperature and, if the amount of fluid in the horns of the uterus is considerable, there will be abdominal distension. The great aid to diagnosis is, as Professor Wright states, a condition such as described above, occurring a few weeks after cessation of œstrum. I can hardly associate diseases of the bladder with gastro-intestinal complaints. The symptoms shown by a dog with an obstruction in the urethra or a calculus in the bladder are very definite and one can usually get a fairly reliable history from the owner. But cases do occur when a dog is brought in with "stoppage of the bowels": they get this idea from the constant straining of the poor animal. Abdominal palpation or rectal examination will quickly reveal the distended condition of the bladder and if further evidence is needed one can pass a metal probe (for urethral calculus) or a catheter into the bladder.

I can agree with the essayist that gastric ulcer is uncommon in the dog. Duodenal ulcer is still more uncommon, and yet only a few days ago I saw a well-marked case of duodenal ulceration and I have brought the specimen for your examination. The patient was a six-year-old male Alsatian. The history was that he had not been feeding well and for the five days previous to my seeing him had eaten nothing. There was constant thirst and irregular vomition. As the dog was in the habit of carrying stones in his mouth I had him X-rayed, but with a negative result. There was no evidence of nephritis, so a diagnosis of chronic gastritis with possible ulceration was made. In spite of treatment the dog got steadily worse and I destroyed him seven days after having seen him the first time. *Post-mortem* showed extensive gastritis with numerous small ulcers and three well-marked ulcers in the duodenum. The gall bladder was remarkable inasmuch as the neck is two inches long and the bladder had made a nidus in one of the larger lobes of the liver. The kidneys were normal.

In dealing with hæmorrhagic enteritis, especially in greyhounds, one has to be cautious. In my experience, there are two types of this condition:—

(*a*) enteritis with liquid stools mixed with blood, great depression and a subnormal temperature;

(*b*) enteritis with high temperature, where the evacuations are almost pure blood.

I consider that the first type is a form of acute nephritis with uræmia, for if a careful investigation is made one will find that the dog has not been himself for some time. He will be over two years old, will have excessive thirst, uncertain appetite and probably "emptying" badly for some days. A nephritis has been present for some time until the blood urea content mounts to such an extent that a condition of uræmia exists. Then acute symptoms of gastro-enteritis appear, with subnormal temperature and death. No treatment is of any avail.

The second type will be seen in the young dog, who, as far as one can ascertain, has never had distemper. The disease is of sudden onset, there is a rise in temperature, and the evacuations are composed of almost pure blood. This type I consider to be a per-acute type of distemper, for the injection of a big dose of homologous distemper serum will bring about a recovery in the great majority of cases.

It is astonishing what filth a dog will eat without causing the slightest inconvenience. But times do occur when a very ripe bird or a decomposing rabbit is consumed, with very disturbing results. Such cases, as a rule, yield very rapidly to treatment. Cases of food poisoning, such as occur in man, are not commonly seen, but I have seen one case which

occurred simultaneously with very alarming and dangerous symptoms in the people who consumed the same food as the dog.

I am very pleased to see that Professor Wright, when discussing "Diseases of Sudden Onset," lays great stress on the condition known as acute or sub-acute nephritis. Some years ago I read a paper to the Central Veterinary Society and had the temerity to describe a disease which I called "Specific Nephritis in the Dog." This condition is an acute parenchymatous or acute interstitial nephritis occurring in young dogs, and is always fatal. It is ushered in with a sudden attack of vomiting and abnormal thirst. One will usually ascertain from the owner that the dog has been drinking more water than usual for some weeks before acute symptoms assert themselves. There is great depression and total loss of appetite and unless one is very careful it is easy to call the case "gastritis." That there is an acute gastritis present one cannot deny, but the great diagnostic symptom is the smell of stale urine in the breath. This smell is caused by the excretion of urea in the saliva. In the dog the normal urea content of the blood is around 55 milligrams per cent. When acute parenchymatous or chronic interstitial nephritis occurs the kidneys become so altered that they are unable to excrete the urea. They still continue to allow water, chlorides, etc., to pass, but the urea is dammed back and concentrated in the blood stream to an extent of 400 mgs. per cent. or over. A condition of uræmia results, which produces great depression, nausea, vomiting, a stiff gait, evil-smelling breath, ulceration of the buccal mucous membrane, stomach and intestines. In a very acute case death will take place from uræmia or hæmorrhagic enteritis within a few days from the onset of the symptoms. In the sub-acute case ulceration of the mouth with the brownish deposit on the teeth is seen and if the patient lives long enough gangrene of the end of the tongue takes place. I have a record of eight cases of typical "Stuttgart Disease" in which the blood urea content varied from 350 to 450 mgs. per cent. The kidneys in all these cases have shown marked lesions of either acute parenchymatous or interstitial nephritis.

Very little is known, from a perusal of veterinary literature, of Stuttgart disease. Wheeler, in the American *Veterinary Medicine* for July, 1930, describes a condition which he calls "Black Tongue" and which is almost identical with pellagra in man. He attempts to prove that Stuttgart is a deficiency of vitamin F in the diet and that the disease could be produced by withholding this vitamin from the food and also could be cured by the administration of this vitamin if the disease was not too far advanced. I cannot altogether subscribe to his view. Stuttgart disease is usually seen in old dogs, in which nephritis of a chronic type is present. On the other hand, several of my cases of Stuttgart with acute nephritis were in dogs 18 months to two years old. Particulars of some of these cases may be of interest.

Case 1.—Two-year-old fox-terrier male. Was seen on January 2nd, 1931, with a history that the animal was drinking excessive quantities of water and was immediately sick afterwards. Total loss of appetite. Pain was evinced upon being handled in the region of the head. There was a distinct odour of urine from the mouth. Acute nephritis was diagnosed. On January 5th the dog was comatose. It was noticed that the tip of the tongue was commencing to necrose. *Post-mortem*: Gastro-enteritis well marked. Kidneys were of the small white variety. The bones of the head and lower jaw were soft and apparently a condition of osteomalacia existed. Histological examination revealed chronic interstitial nephritis with superimposed parenchymatous changes.

Blood Analysis: Non-protein nitrogen, 350 mgs. per cent.

Urine Analysis: Albumin +++; sugar, slight trace; acetone, absent; urea, 2·10 mgs. per cent.; blood present +.

Deposit: Hyalo-granular casts +; pus cells ++; epithelial cells +; calcium oxalate +.

Case 2.—An eleven-year-old fox-terrier bitch, taken suddenly ill on Tuesday, February 15th, 1932, with acute vomiting. This continued in spite of all treatment until I destroyed her on the 18th. I diagnosed chronic interstitial nephritis. The breath was very offensive and gave forth the characteristic odour of stale dog urine. *Post-mortem* revealed no lesions of any kind. The bitch was very fat. The kidneys do not give one the appearance of chronic interstitial nephritis.

Pathologist's Report:—

Acute nephritis, the most marked changes being present in the convoluted tubules.

Biochemist's Report:—

Blood: Non-protein nitrogen = 183 mgs. per cent.

Urine: Urea = 1·0 gms per cent.; albumin – present ++.

Deposit: Granular and hyalogranular casts +; epithelial cells +; few pus cells ; few calcium oxalate crystals.

Case 3.—A four-year-old Aberdeen terrier who I had known since nine weeks old. He has never been a robust dog. A few days previously he had an attack of hysteria. Treatment consisted of dram doses of elixir bromo valerian. He had a slight attack the next day, but none afterwards. The owner complained that he would not eat but was always smelling at every object. He had a pronounced thirst and would vomit after filling his stomach. I saw the dog a few days later and had no difficulty in diagnosing nephritis. With careful dieting the vomiting ceased, but the hunger for water still continued. He would not eat at all. Treatment consisted of the administration of raw liver juice, orange juice and salol gr. 5 twice daily. As the dog got worse he was destroyed and a *post-mortem* made (after much opposition on the part of the owner). The kidneys do not look like acute nephritis, but chronic interstitial.

Pathologist's Report:—

Chronic interstitial nephritis, the fibrous changes being very prominent in the medulla.

The parenchymatous cells of the convoluted tubules also displayed degenerative changes, which probably accounts for the presence of albumin in the urine.

Biochemist's Report:—

Blood: Non-protein nitrogen = 219 mgs. per cent.

Urine: Urea = 1·8 gms per cent.; albumin – present ++.

Deposit: Pus cells ++; nothing else of note seen.

Chronic interstitial nephritis is a very common camplaint in dogs over eight years old and, strangely enough, one seldom sees a bitch affected. When the kidneys become so fibrous that they cannot eliminate the urea from the blood stream, then symptoms of ūræmia appear and soon cause the death of the animal. The diagnosis of this condition can be made with absolute safety. The mouth always smells like a dog kennel that has not been cleaned out for weeks. Then there is the vomiting, stiff gait, pronounced thirst and total loss of appetite.

Major Hamilton Kirk, m.r.c.v.s. (London), who opened the discussion with Major Chambers, said:—

The gastro-intestinal diseases of the dog and cat form an exceedingly important part of the daily work of those who conduct canine practices. Nobody realises this more than I do; thus, when this subject was chosen by the Provisional Committee, at my suggestion, it gave me considerable pleasure to find myself provided with an opportunity of sharing the duty of opening the discussion of Professor Wright's paper.

At the outset I would like to express my great appreciation of this paper. It is the kind of excellent product which I should expect from its author, and Professor Wright has again revealed himself as an intensely observant and practical interpreter of pathological conditions. (Hear, hear.)

When first embarking upon the task of discussing a thesis, sometimes one's natural impulse is to seek out some flaw or erroneous conclusion upon which one could level criticism. I found in this paper nothing to which I could take serious exception, and but little divergence from my own views upon the subject.

One of Professor Wright's earliest statements is to the effect that no diagnosis is so abused as that of gastritis, a condition which he contends is comparatively rare. I entirely agree with the first part, but think that gastritis is far from being infrequent in its incidence. I have to ask myself, however, what clinically is the dividing line between a congestion of the gastric mucous membrane and an inflammation? The latter is, surely, only an extension of the former.

I would like Professor Wright to be kind enough, in his reply, to give me a differentiation for my future guidance.

The essayist tabulated his cases encountered in the Poor Out-Patients' Clinic, and it is worthy of note that distemper heads the list numerically; yet it seems extraordinary that there were only 116 such cases out of a total of 3,327 animals attended. In view of the ubiquity of this disease and the ease of its transmission, one wonders a little whether some of the unclassified or undiagnosed cases (102 in number) should not have been included under the heading of distemper.

I am a little surprised, too, that out of over 3,000 cases, only 34 were diagnosed as being infested with ascarides. I have little doubt that had those 3,300 cases been examined *post-mortem* the number affected with ascarides would probably have been nearer 40 per cent. It is fair to recall that these 34 cases were all in puppies under six months of age, and one has to conclude that Professor Wright attaches little importance to the incidence of round worms in dogs over that age, or presumably he would have included older dogs in the classification.

I believe that the *majority* of adult dogs harbour worms of one kind or another, but I feel sure that the cause of numerous illnesses is too often ascribed to their presence. So many persons seem satisfied to label a dog's complaint "worms" when no other conclusion can be arrived at. The danger of this lies in the administration of drastic vermifuges when probably there is already an unsuspected enteritis.

It should not be forgotten that, although a positive diagnosis of ascariasis may have been made by microscopical examination of the fæces in given cases, worms or eggs may exist concurrently with other diseases and sometimes unassociated with any discoverable disease.

Diagnosis of disease in animals is admittedly often very difficult, and I would like, therefore, to call especial attention to Professor Wright's advice concerning the manner in which one might tackle it. He tabulates a list of important questions to the owner, the answers to which should be committed to paper, and considered carefully, after the patient has departed. Anybody who has ever consulted specialists in the sister profession must have noted with what meticulous care these gentlemen collate all the facts about the case, as you sit there and recite them. And it is undoubtedly of the greatest assistance in puzzling cases, as I, personally, have not infrequently proved. One is able at leisure to marshall the facts, and assess the value of each in relation to the others.

Especially important, in almost every case of doubt, is the examination of urine. I am glad to find that the essayist has given this matter such prominence. Those practitioners who habitually dispense with this line of investiga-

tion would be agreeably surprised (if they adopted it) at the number of instances in which it proved of the greatest assistance. For instance, quite recently I was confronted with a rather puzzling case of malaise, loss of condition, occasional vomiting, and capricious appetite in a Chow—the property of a Harley Street surgeon who was on the Board of Examiners. I naturally wished to be a little extra careful with my diagnosis. A slightly increased thirst and diuresis prompted me to test the patient's urine, and the findings were entirely consistent with chronic interstitial nephritis.

Of the tests for albumen, the essayist did not mention one which is commonly used by medical men—namely, Esbach's Reagent. This can be kept in stock, and a few drops added to the urine will produce immediate turbidity, if albumen is present, after boiling, or after a few hours' standing without boiling. The coagulation produced is far more dense and a quantitative test is easier and more certain.

Professor Wright tells us that vomiting and diarrhœa are early symptoms of distemper and that a rise in temperature is helpful in diagnosing this disease. In young dogs I make it a rule to suspect distemper and to warn the owner, whenever these two symptoms are exhibited, unless some other cause is quite apparent. But I am doubtful as to whether either slight or pronounced pyrexia is of any help at all in diagnosing the malady as distemper. We may encounter these two symptoms, together with a rise of temperature, in all of the following conditions: intussusception, pyometra, hæmorrhagic gastro-enteritis, acute prostatitis, enteritis, acute nephritis, and some others.

Of course, there are methods of making a differential diagnosis when all the characteristic symptoms have appeared in each case; but my point is that in the early stages of any of these diseases one may observe simple fever, diarrhœa, and sickness, with absolutely nothing else to guide one as to the etiology.

Differential diagnosis in dumb animals, therefore, demands a very close and detailed study, the truth of which is well exemplified in the case-histories recorded by Professor Wright in his paper. I have found, for instance, upon analysing the clinical histories of Wright's cases, that a definite group of symptoms was common to a number of different diseases. Thus, vomiting, diarrhœa, lassitude, loss of appetite and condition, increased thirst, and from one to three degrees of fever, were commonly present in nephritis, hepatitis, gastritis, intussusception, and obstructed bowel. Variations of this syndrome were few indeed, but outstanding instances of differentiation were the possibility of some jaundice in hepatitis, of necrotic stomatitis and œdema in acute nephritis, and of abdominal pain in obstructed bowel and invagination.

Professor Wright has rendered good service to practitioners in reminding them of these facts, and in exposing the fallacious idea that vomiting and increased thirst are invariably associated with gastritis. The practitioner is set a problem when he is confronted with an animal suffering in the way I have indicated, and one of his first duties is to examine the urine in an endeavour to rule out kidneys or liver as the seat of disease. He will not then fall into the trap (which so easily catches the quack) of making a lightning rule-of-thumb diagnosis of gastritis.

Of the 3,300 College cases mentioned by Wright we find records of only 10 cases of chronic enteritis and no cases of the acute condition. This seems very strange to me, in view of the prevalence of feline enteritis, which is often so acute in its onset and rapid in its course that the cat may be dead within 12 hours of becoming ill. It merely vomits, shows a temperature of 103° or 104°, sits huddled up all day, and refuses any kind of food. These symptoms, combined with probable tenderness on palpation of the abdomen, constitute a typical picture in this disease and the cat, just before death, commences to utter characteristic plaintive, weak cries.

In the acute gastro-enteritis of the hæmorrhagic type, so common in greyhounds, the clinical picture is different. Often the first indication that anything is amiss is the appearance of pools of bright blood passed *per rectum*. The dog may even then appear bright, but usually it is depressed and has an elevation of three to four degrees of temperature. Vomiting and diarrhœa ensue and the prognosis is serious. With appropriate and early treatment probably 60 per cent. recover.

In times gone by I have been very worried indeed by cases of the most obstinate chronic diarrhœa in dogs and cats of all ages. It has often been most difficult to determine the cause, coccidiosis and ascariasis having been ruled out by microscopical examination of the fæces. Intestinal cancer, tuberculosis, and Bright's disease, are not to be overlooked in middle-aged or old animals; whilst in the young, the most likely cause will be parasites, bad feeding, or catarrhal enteritis associated with distemper. Other causes are chills, colitis, invagination, portal obstruction, senile decay and pancreatic disease.

I have observed one or two cases of chronic pancreatitis with atrophy of the gland in dogs, the chief symptom of which—in life—was the passage of a putty-like motion having a dirty white colour and a most offensive sourish odour. The diarrhœa is probably dependent upon the excess of fat and undigested muscle fibre in

the fæces. These cases were marked by great debility, emaciation, some vomiting, bouts of pain, and glycosuria. The feeding of raw pancreatic glands seemed to alleviate the symptoms somewhat, but there was no cure. I reported my last case in the *Veterinary Record* some three or four years ago, and since then I have learned that there is a method of diagnosing pancreatitis. This is known as Cammidge's Pancreatic Reaction. Indican and bile in the urine are also suggestive of the condition.

Professor Wright believes that enteritis is the most frequent cause of chronic diarrhœa, and yet he records only 10 cases of chronic enteritis in a whole year. These two facts can hardly be reconciled. Personally, I favour the view that chronic mucous colitis is by far the commoner cause. Mucus is found in the stools and diarrhœa is alternated with brief periods of constipation. Examination sometimes reveals a distended and tender colon; the attacks may last for weeks or even months and produce a serious loss of flesh and some nervous irritability. Colonic lavage with physiological salt solution has proved the best treatment in my hands. For cases of putrid diarrhœa I find a combination of potassium permanganate and thyroid very useful.

It is a function of the colon to abstract water from the fæces and pass them to the rectum in a moderately formed condition. For some reason, then, the colon fails to perform this function; or it may be that peristalsis being too active, drives the ingesta along too fast, allowing insufficient time for absorption by the colon.

I would have wished to discuss Professor Wright's paper at much greater length, but as I am limited to about 10 minutes (which I fear have been already exceeded) I have been able only to touch the fringe of the subject.

Captain F. C. Gillard (Folkestone) observed that a bad throat prevented him from entering so fully into the discussion of that paper as he had hoped to do. However, he should like to thank Professor Wright for a paper that he regarded as one of the most able papers ever submitted to Congress. (Hear, hear.)

He desired to refer to two or three matters which had occurred to him during the morning. The first was with regard to the symptoms recorded under the heading of gastritis and enteritis. He thought a large number of those cases were connected with a general toxæmia, but there seemed to be a good deal of difference of opinion as to the actual cause.

He would ask Professor Wright if he regarded balanitis, which was so common in the dog, as being a contributory factor or a primary cause in many gastric and intestinal disorders, despite the fact that it was usually dismissed as being of little importance. He had noticed on several occasions that licking the discharge from the prepuce, produced both emesis and wasting. He had proved that by preventing the dog from licking himself, by fixing hoods on the patients, when the emesis stopped. It should be noted, moreover, that those cases were not in the early stages. He allowed those dogs he had under observation to have their hoods off for one or two nights, and the emesis returned; it was, indeed, so pronounced that he concluded that the licking of the prepuce must be an important factor in its production.

Another contributory cause of gastritis and enteritis—if, indeed, it were not a primary one—was pyorrhœa. In his view, pyorrhœa and sepsis of the gums were very important in canine work; being, he believed, a constant cause of gastric and intestinal disorders and subsequent toxæmia.

Something had been said about obstruction of the bowel always causing stretching and vomiting. He had a case in a Dalmatian which he would like to record, the ultimate obstruction being caused by a large pebble in the duodenum. He was very uncertain about the nature of the condition at first, as the bitch had been in season and was brought to him with a very indefinite history. However, there was intermittent emesis over a period of several days, the patient refusing all food and drink, but giving no evidence of pain; there was marked wasting at the end of a week and though the emesis had stopped the patient still refused to take any nourishment. The temperature was at first 103·5° F., but this fell to normal after three or four days. It was exactly eight days after he had seen the dog for the first time that he was able to detect the presence of some obstructive agent, and that was because it had then passed out of the stomach into the duodenum. There was no return of the vomition and no marked pain. He performed laparotomy and located the pebble and so performed enterotomy, removed the pebble, and the dog did well, despite the fact that the bowel wall was bordering on necrosis at the site of lodgment.

Some mention had also been made of calculi, and he desired to record one case of the occurrence of calculus—a very small one—in the neck of the bladder of a male Sealyham. This dog occasionally would stop during his "jaunts," stretch his neck and apparently try to vomit, show acute pain for a minute or so and then all was well. That sequence of events was noticed three or four times and the condition was diagnosed as calculus in the neck of the bladder. The animal was sent on to him for consultation and he had it under observation for three weeks. It showed nothing whatever until the end of that period, when the series of

symptoms he had recorded were revealed. He operated and removed the calculus.

Mr. H. Bell (Maidenhead) said that he should like, first of all, to thank Professor Wright for his very excellent paper, which would doubtless appeal strongly to the practitioner.

He wished to ask Professor Wright what was the significance of the finding of albumen in the urine. In the last two years he had been taking a number of samples of urine from dogs. In one or two cases he had met with dogs showing typical symptoms of nephritis and, having found albumen in the urine, had given a grave prognosis, yet the patients made complete recoveries. Only the other day he had seen a dog which eighteen months ago he had declared was going to die because it had been showing all the symptoms of chronic nephritis, he had found albumen in the urine, and now it was the best looking dog in the district. (Laughter.) On another occasion a dog went down in his kennels showing what he took to be symptoms of acute nephritis, and died in a coma. In that case he had taken a urine sample and found albumen, but on *post-mortem* examination neither he nor the pathologists could find anything wrong with the kidneys. He understood that medical men did not attach much importance to finding albumen in the urine of young men, in some circumstances at any rate.

Professor F. T. G. Hobday said that he should like to add his quota of praise and to congratulate Professor Wright on the able way in which he had made use—as he always did—of the wonderful material which was afforded by the College clinique. It was a further instance—and he was sure they would all agree with him in this—of the right man in the right place. (Hear, hear.)

The paper was well thought out and demonstrated the importance of the questions raised. In the position in which Professor Wright was he had opportunities for the diagnosis of those different diseases which, of course, were not open to everybody in practice, but it was always open to anyone to utilise Professor Wright's knowledge and experience, for no-one was more willing and eager to give help than Professor Wright had been during the time he had been appointed at the College. (Hear, hear.)

The value of modern methods of treatment and diagnosis had been well illustrated in his paper. How different it all was from the days when they were students! The use of, and application of the X-rays to animal surgery or to the diagnosis of animal ailments had come into its own, at all events with the smaller animals. The time was past when they spoke of the prospects of X-ray work being of value to the veterinary surgeon in small animal practice: X-rays had come to stay, the only question being the opportunity of getting them applied. That difficulty, however, was almost overcome, as their colleagues in the medical profession were willing to help them at the hospitals, while the portable apparatus, of which Major Hamilton Kirk had been such an able exponent during the past year or two, had contributed largely to overcoming the difficulty of securing an apparatus and a man who could explain what was seen.

Major Chambers had alluded to the advantages and disadvantages of the use of chloroform. The increase in the former was, again, an improvement which had been made possible during the last few years. In earlier days the use of chloroform generally meant that seven out of ten patients would not need any further diagnosis than a *post-mortem*. But there were other anæsthetising agents which could be used, without running any risks whatever with chloroform itself, before making a diagnosis, and local anæsthetics or narcotics answered equally well and could be used with perfect safety by the veterinarian.

The paper had gone over the subject very thoroughly and so well that there was very little to discuss at all. It only remained for him, therefore, to congratulate Professor Wright on bringing before them a paper which could be read over and over again when cases of the kind came before them.

Mr. E. P. Barrett (Margate) said that he should like to add his congratulations to Professor Wright on his magnificent paper. It was the sort of paper he should have expected from him, having had the pleasure of associating with Professor Wright as fellow students at College. (Hear, hear.)

One of the points in diagnosis that Professor Wright raised, was frequency of urination. He (Mr. Barrett) felt that the incidence of lamp-posts and trees in both town and country was such that, in the case of the dog, this must be extremely difficult. He wondered if Professor Wright took his patient out for the day in the middle of Salisbury Plain for proper observation of that point. He agreed with Mr. Bell's observation that one found quantities of albumen in the urine very frequently, and it was very difficult to decide what quantities indicated some disease process in the kidneys. He wondered whether much of it was due to the presence of pus cells derived from the prepuce.

On the question of hæmorrhagic enteritis, Major Chambers recognised a sub-acute type that he considered was quite unrelated to the acute type, which he described as being acute distemper. He did not agree with Major Chambers there, nor in his suggestion that the sub-acute type practically never recovered, for

he (the speaker) had found recovery to occur after the injection of formalin intravenously in the majority of cases. With reference to Major Chambers' assertion that the acute type responded to the administration of homologous distemper serum, he pointed out that this commodity is of comparatively high cost, while one could estimate the cost of 10 minims of formalin in 2½ c.c. of distilled water as being negligible, and this, given intravenously, was certainly 90 per cent. successful: therefore he should continue to use formalin.

He should like Professor Wright to tell them if there was any possibility of diagnosing pyometra by X-ray.

He thought it was Major Kirk who mentioned the question of the diagnosis of distemper in a puppy which had sickness, diarrhœa, and a high temperature. He had always been led to think that the main thing was to watch the temperature night and morning for several days: if one got an early rise, followed by a fall to normal and then a rise, which was maintained, combined with catarrhal symptoms, one could be as certain as possible that the case was one of distemper and that the use of serum at once was indicated.

Mr. W. Jackson Young (Newcastle-upon-Tyne), having extended his congratulations to Professor Wright upon his paper, proceeded to say that the paper and discussion had recalled to his mind the days, now far off, when he was actively engaged in canine practice, and had engendered in him the fervent wish that in those days he had had the advantages indicated to them by Professor Wright.

The paper was a glorious example of the value of chemistry to veterinary medicine. He congratulated the essayist on the selection of the tests he had mentioned in the paper.

In long years of study of organic chemistry and urine analysis he tried to find a means of diagnosing tuberculosis, but failed.

He was satisfied that the analysis of canine urine was very valuable and he hoped that students of the present day were shown these tests and taught to interpret results. He found the Hay test for bile salts of great value in his work, not so much as regards dogs, but with pigs. In his view, some modification of that test was necessary. It seemed that a lot depended on the amount and variety of sulphur used and on the proportion of urine to the sulphur.

The Indican test was quite a simple one and he interpreted a positive reaction as indicating chronic obstruction of the alimentary tract or intestinal indigestion.

He looked on the Van den Bergh test as a very delicate test and he rarely found it to fail. When he got a diphasic reaction he knew that the animal was in a parlous condition.

He agreed with the essayist in regard to the sex incidence of liver disease in animals. He had come to the conclusion, after making thousands of *post-mortem* examinations, that it was more common in females. When actively engaged in meat inspection he had looked, relooked and looked again for a case of cavernous angioma in a bullock but had not found one.

The paper contained numerous references to vomiting and diarrhœa. It was important that we should examine what came from or through our patients. He had seen a collection of plaster casts showing the various types of diarrhœa encountered in children and he thought such would be useful although it was difficult to preserve the smell on such casts.

In treating gastric and intestinal conditions they should start at the mouth. He had a friend who did well by supplying his clients with tooth brushes and tooth paste for use in canine cases. He congratulated Professor Wright for giving them a fine essay; he had had an excellent text and had preached a splendid sermon therefrom.

Mr. Tudor Hughes (Oswestry) rose to remark that he thought all would appreciate it if Professor Wright would make some remarks as to the diet in and treatment of the conditions he had so adequately described.

The Chairman (Prof. G. H. Wooldridge, London) said that, as no-one else appeared to be anxious to join in the discussion, he should like to say one or two words in winding up the debate.

He might, in the first place, point out to Mr. Tudor Hughes that treatment did not come within the scope of the paper, but, on the other hand, he was not suggesting that Professor Wright, if he found time to do so, might not comply with that request.

The paper itself had very rightly been eulogised on all sides, and he was glad to say that he was in agreement with almost everything that had been said in that direction. Indeed, he was particularly proud of it because he found in the paper quite a number of things which he had at one time the opportunity of expounding to Professor Wright and which, with his added experience, he had been able to emulate in a very excellent degree.

He would like to refer to Mr. Jackson Young's remarks, especially with reference to the importance of the examination of the ejecta and dejecta, but if Mr. Jackson Young practised that to the exclusion of the smell, he would be excluding one of the most important aids to diagnosis in regard to their interpretation.

Professor Wright had given a long list of conditions of which vomition was a more or less frequent symptom, and he thought he had given a very excellent lesson in that respect, because the main part of the paper, he took it, was really devoted to the question of vomition and

the interpretation of vomition as a symptom of disease. In this connection it must be remembered, however, that while it was easy to jump to the conclusion that a vomiting dog had some gastric trouble, one found on *post-mortem* of cases in which vomition had been a prominent symptom, that comparatively few of these were cases of true gastritis. The vomition was very frequently a symptom of conditions that might not readily be associated with it—for instance, pyorrhœa: he had noticed that tooth-ache was not infrequently a cause of vomition in the dog. Another condition that might have been mentioned by the essayist as responsible for vomition was tonsil trouble. He thought that if they would take the trouble, in many of those instances where vomition occurred, to examine the back of the throat by opening the mouth and depressing the tongue, they would find one or both sides of the pharynx exhibiting an enlarged tonsil. That would explain, in many instances, the failure of all measures taken to check intermittent vomition in such dogs.

Another condition not uncommon in intermittent vomition was prostatitis. Still another was impaction and inflammation of the anal glands. Another cause was heart trouble, and here one must be wary, because cardiac irregularities were often themselves secondary to gastro-intestinal trouble—but that fact must not side-track one.

Another cause of vomition that he did not think had been mentioned was tuberculosis. He had met with several instances of persistent vomition which puzzled him and which eventually proved to be tuberculosis in the dog. He thought perhaps one way in which one could get some assistance in that regard was the occurrence of vomition without any relation to food.

The importance of the examination of urine had been emphasised by several people, in particular in relation to the production of vomition, but he had observed that several people, including Professor Wright and Major Chambers, had regarded nephritis as being the cause of Stuttgart disease. He took a little exception to the use of the term Stuttgart disease in that connection, because Stuttgart disease, when it originally broke out in this country, was a very definite primary gastro-enteritis. One would therefore suggest that the conditions produced as a result of nephritis were Stuttgart disease-like and should not be designated cases of Stuttgart disease.

One little over-statement had crept into the paper, where Professor Wright had referred to conditions to be differentiated from cases of obstruction of the small intestine. Those conditions (it was stated) were enlargements of the mesenteric glands, a pendulous kidney and stone in the bladder: "This condition can be positively diagnosed by rectal palpation." It could be surmised in many cases, but he would not go so far as to say that it could be positively diagnosed by rectal examination, particularly in large and fat dogs and those with very tense abdominal walls, for all one could reach in many dogs was the rear portion of the pelvic rim. It was also suggested that an intestinal obstruction might be situated six inches or more in front of the rectum, and it was said that that might be missed. One could not, he submitted, make it an easy matter to observe the condition in the one case, and an easy matter to miss it in the other. In many instances one had found it necessary to anæsthetise in order to get some relaxation.

Concerning the presence of hepatitis being more common in the female than in the male, doubtless Professor Wright had only arrived at that conclusion after careful observation, but he himself had not been able to observe any difference in its incidenec in relation to sex. He pointed out that of the six cases quoted by Professor Wright himself, four were in male dogs and only two were females.

Having contributed his quota of thanks to Professor Wright, he would now ask him to reply to the discussion.

THE REPLY

Professor J. G. Wright (London) said that firstly he would like to thank his hearers for the very kind way in which they had received his effort to produce a paper of interest to them. Secondly, he desired to congratulate the openers of the discussion on the excellent manner in which they had carried out their task. He was extremely fortunate in having two such able clinical observers to perform that function, and he thought it rather striking that he and they were largely in agreement. If the time was about to arrive when veterinary surgeons agreed with one another, particularly when they did not work together, he felt that an advance was being made. (Hear, hear.)

He made no excuses for the aspect of the subject he had selected, for he found that, at the recent meetings of the British Medical Association, Dr. C. B. Heald was reported as having said, on the subject of quackery, "It can be laid down as a safe axiom that when diagnosis becomes accurate, quackery walks out of the door"—and he (Professor Wright) felt that it was not inappropriate, at that moment, for them to bear this advice in mind, especially those who were dealing with dogs. It was for that reason that he had tried to lay stress on the importance of exploring every available aid before one made a diagnosis. It might be said by some that an accurate diagnosis could only be made on *post-mortem*. He (Professor Wright) disagreed: there was much

more to be discovered by observing the vital functions of a living animal than there was from a cadaver in the *post-mortem* room. *Post-mortem* examinations, and particularly macroscopic ones, often conveyed very little.

He had brought down a number of pathological specimens from the Museum of the Royal Veterinary College, illustrative of some of the conditions which they had been discussing. He also wished to exhibit a series of X-ray photographs indicating the use of opaque meals as an aid to the diagnosis of diseases of the alimentary canal. Some of them were examples of cases in which a barium meal had facilitated the making of a diagnosis, whilst the remainder was a series to illustrate the passage of the barium meal along the alimentary canal. He was exceedingly anxious that clinicians should avail themselves of the means now at their disposal for the diagnosis of conditions which would otherwise inevitably remain obscure.

Might he here interpolate the remark that he felt grieved at the short time they had left at their disposal for the discussion. (Hear, hear.) He thought it should be put to the " National " that discussions should be split up into sections; and so overcome the tendency for one section to encroach upon the time of another, as had happened that day.

Major Chambers had said that it was his experience that the commonest cause of intussusception was malignant jaundice. He (the speaker) remembered an eminent clinician stating that it was invariably caused by distemper. They could not be dogmatic. He had come to the conclusion that any condition in which there was dilatation of the small intestine by gas, associated with rapid and spasmodic gut contraction, was likely to cause intussusception. He had seen the condition to which he referred actually take place during a laparotomy, and the dog ultimately die of an intussusception. He would say that not only distemper and hepatitis, but also such conditions as ascariasis in young dogs, and chronic enteritis in old dogs, were all likely causes of intussusception. They must not confuse cause and effect: while the immediate cause of death was the intussusception they must look at the cause of the intussusception.

The diagnosis of pyometra was, of course, very difficult, for in many cases the animal died without the cervix uteri having opened. He laid great stress upon a careful rectal examination. Let them first of all make themselves familiar with the normal cervix and body of the uterus as it felt under the finger on rectal examination, and then they would recognise the differences associated with pyometra. It was essential that surgical interference should be carried out early.

Major Chambers had mentioned that he did not think that they should have much difficulty in differentiating bladder disease in the male from alimentary disease, and he (Professor Wright) had expressed agreement with that point in his paper, but it was more of such conditions in the bitch of which he was speaking. Mr. Barrett had mentioned the frequency with which the dog could urinate against a tree—apparently the tree had no agglutinins for the bitch. (Laughter.) Cystic calculus in the bitch, however, often gave rise to symptoms which appeared to be alimentary in origin, for she vomited. He had had experience of a number of occasions on which skilled observers had diagnosed stone in the bladder, and that stone had been colonic impaction.

Concerning Stuttgart disease, he had to bow his head to the greater experience of Professor Wooldridge, who told them that the old disease was a definite clinical entity: the speaker's experience, however, was that what they diagnosed as Stuttgart disease was not. He considered that necrosis of the buccal mucosa would occur in any acute toxæmia.

In reply to Major Kirk, he would like to point out that the numbers he gave referred to dogs only. He agreed that one of the commonest causes of death in young cats was what they termed " infectious enteritis of the cat."

He was glad to hear Mr. Jackson Young—a man of great chemical experience—agree with his selection of urine tests. Esbach's test had been mentioned. This was a quantitative test, whereas those he (Professor Wright) recommended were all qualitative ones. Such could be carried out by the practitioner quickly and without elaborate apparatus. Experience with the tests soon indicated the significance to be attached to qualitative reactions.

Regarding distemper, his advice was that if they met a young and susceptible dog that had a rise in temperature of 104-105° F., they should administer serum at once.

He did not mention pancreatitis, because the symptoms were not often confused with primary alimentary disease: the animal was often ravenously hungry—vomiting was absent, analysis of the fæces revealed an excess of fat (he had seen a case in which the fat present in the fæces was 12 per cent.) and urinary examination usually revealed glycosuria.

Mr. Bell had raised the question of the significance of albumen in the urine, and it was a very important one. They could not diagnose disease by finding albumen in the urine alone; they must go further and correlate its presence with the symptoms exhibited by the patient. In acute nephritis in young animals the degree of albumen was high: they put it at + + +—on centrifugalising the urine one found what that albumen comprised. In acute nephritis it was

made up of the epithelium of the convoluted tubules and casts. In that condition the albumen content was high, the specific gravity was high, the urine was dark in colour and it was scanty in amount. In chronic nephritis the amount of albumen was lower—+ or + + —(they might have difficulty in recognising albumen by boiling alone, but the nitric acid ring test and the salicyl-sulphuric acid tests always revealed its presence); the specific gravity was low; the quantity was copious and of a very light colour. He would suggest that in every one of those cases they should examine the patient's heart, for they would find heart changes. He had not yet found a satisfactory way of examining a dog's blood pressure as a routine measure, nor did he do urea concentration tests, for which they must obtain urine at specific intervals.

He quite agreed with Mr. Bell's remarks concerning obstruction of the colon.

Proceeding, Professor Wright observed that he would like to thank his Chief, Principal Hobday, for the very kind remarks he made on his paper. The fact must not be lost sight of that it was entirely due to Principal Hobday's unbounded energy and his never-failing optimism when clouds were blackest that they had been able to carry out their work. The Royal Veterinary College might have ceased to exist had it not been for Professor Hobday. (Hear, hear.)

Mr. Barrett had enquired as to the possible value of the application of X-ray to the diagnosis of pyometra. That was the subject he hoped to get on with next: he was just wondering if barium injections into the vagina would give them some indication of the outline of the uterine body and cervix.

Mr. Jackson Young had referred to the tests of urine for the presence of bile, and mentioned the Hay's sulphur test. It was extremely simple: if the sulphur fell to the bottom, indicating the presence of bile salt, they then carried out Gmelin's test for pigment. The Van den Bergh test was valuable in the diagnosis of liver disease. The test was carried out on the blood serum.

The Chairman had mentioned tonsillar trouble. He had not referred to that in his paper, because it was not often that one was confused—but he quite agreed with him. One of the common conditions they met with in old dogs was carcinoma of the fauces. The clinical picture was a dog that was progressively losing flesh that had difficulty in swallowing, and howled when one opened the mouth.

He agreed that the majority of cases of hepatitis he had cited were in male dogs, but he adhered to his plea that the majority, speaking in the general sense, were in females. In bitches they met with a type of hepatitis that gave rise to a hæmorrhagic breakdown of tissue, and he believed he was right in saying that Dr. Tom Hare was inclined to the opinion that the condition was not of neoplastic origin but was of an inflammatory nature.

Concerning the difference between congestion and inflammation of the gastric mucosa, he thought they were all agreed that in inflammation there must be proliferation and exfoliation: they would not find these in the apparent gastritis that accompanied acute nephritis. Captain Gillard had referred to catarrh of the prepuce as a source of gastro-enteritis, and Major Chambers in a conversation had told him that he considered that one of the commonest causes of acute toxæmia in dogs was the licking of preputial catarrhal discharge. He (Professor Wright) had hitherto looked upon this condition as almost normal, and had considered the material innocuous.

In reply to Mr. Tudor Hughes, as regards treatment, he had not much to say except "let treatment be rational." He had no great respect for drugs. They had heard a great deal about formalin. How did formalin act? It seemed to him very unlikely that five minims of formalin introduced into the vascular system of a dog weighing twenty pounds could kill any organism. It might be of interest here to refer to the work of those French observers who, by subjecting tetanus toxin to the action of formalin, found that it became detoxicated without losing its antigenic properties. They termed it anatoxin and by its use animals could be actively immunised against tetanus. It was certainly striking that they found formalin of value in acute toxæmias, and he put it to them that it might be due to the detoxicating power of the agent.

In the treatment of acute and chronic nephritis he withheld meat; for though he agreed that it was a rational diet for a dog, yet it must be contra-indicated in the treatment of a disease in which there was a marked reduction in nitrogenous elimination. In those cases he placed the greatest value on feeding sugar.

In chronic nephritis he had had very good results by giving large doses of alkali. He administered potassium bicarbonate.

An interesting method of destroying mosquitoes is being studied in the Camargue, France. It consists of the use of an apparatus containing an electric light which attracts the insects, after which they swarm along a tube and come into contact with an electric wire with fatal effects. It is claimed that one machine destroyed 6 lb. of mosquitoes, or, according to the estimate of an entomologist, over 3,000,000 insects.

LACTATION TETANY*

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About eighteen months ago the attention of the Animal Diseases Research Association was drawn to certain cases of sudden death in cows, occurring in the Border Counties north of the Cheviots. Mr. Lothian, Veterinary Surgeon, Duns, had first noted the condition in his practice in Berwickshire about nine years previously, and had observed that the incidence of the disease had increased greatly within recent years. To the *Veterinary Record* of May 23rd, 1931, Mr. Lothian contributed a short article giving a brief account of his experiences with this condition, which he called "lactation tetany." In the course of his paper he made reference to the fact that he had sent a sample of blood from one of the cases to the Moredun Institute for examination, and that a chemical analysis of it had been made by me.

As a result of the publication of his paper several practitioners in Scotland and in England wrote me regarding a similar condition which they were observing in dairy cows, and at the same time specimens of blood from the affected animals were sent for examination from districts as wide apart as Herefordshire, Oxfordshire, Cumberland, and the Lothians. Since then several articles have appeared in the professional journals, dealing with the subject, and no doubt you are all more or less cognisant of the main facts. For the purposes of discussion, however, it may be profitable to review and collate the information regarding the signs and symptoms of "lactation tetany," as they have been reported to me by the members of your profession. At this juncture let me say that the adoption of the name "lactation tetany," whilst perhaps convenient, may not be altogether wise, until something more definite is known regarding its etiology.

All seem to be agreed that it is in breeding cows that the condition is found, and the incidence seems to be related to the post-parturient period. Experiences, however, seem to differ regarding the latter, as cases have been reported to me as occurring in dry cows.

The symptoms are familiar to most of you. Two types have been recognised: acute and subacute.

In the acute type the onset of the disease may be so rapid that nothing unusual is noted before the animal is found lying down and unable to rise. The respiratory rate is increased, and the temperature raised as much as 5° or 6° F. The neuro-muscular mechanism is hyperexcitable, varying in degree from tremor of superficial muscles to opisthotonus and extensor spasms. Spinal and cerebral reflexes are much exaggerated. Champing of the jaws, frothing at the mouth, and retraction of the upper eyelid, giving the appearance of exophthalmos, complete the picture. The animal is usually dead in a few hours.

The sub-acute type shows premonitory symptoms in the form of anxiety, loss of appetite, and disturbance of the proprioceptive reflexes. The temperature is about 4° above normal, and there is an accompanying hyperpnœa. Rumination ceases, and the neuro-muscular involvement becomes more pronounced. Tremors develop in the superficial muscles, the animal becomes recumbent, and temperature, pulse rate and respiratory rate are all increased. The animal may or may not lose consciousness, and if untreated dies on the second or third day. *Post-mortem* findings are in most cases negative, although in some instances there are blood extravasations in the subcutaneous tissues and under the pericardium and intestinal mucosa.

Such is a brief description of the clinical history as conveyed to me. On what grounds can these symptoms be explained? There is a wide field here for speculation, but speculation itself may be wild if the hypotheses put forward are not capable of proof. On a purely physiological basis it would be reasonable to assume that the disturbing factor is acting upon either the peripheral nerve mechanism, or the central nervous system; or upon both. Practically all the phenomena could be accounted for on the assumption that there was an increased excitability in the synapses of the C.N.S. So far, for speculation. The next step was to see if an examination of the blood would give any evidence of the presence in it of some factor which might produce such an increased excitability.

Specimens of blood were sent to me by members of your profession, and I here express my great indebtedness to them for the trouble which they took. It was not very heartening to them to send me sample after sample of blood, and fail to receive a remedy by return of post. I know, however, you all appreciate the fact that one cannot come to any sound conclusion on the basis of the analysis of one specimen of blood, or even after two or three analyses. So far as possible each sample submitted was subjected to a quantitative biochemical examination as regards fourteen constituents. Those of you who have experience of such matters will appreciate the work involved. The constituents estimated were glucose, sodium chloride, creatinine, hæmoglobin, fibrinogen, albumin, globulin, amino-nitrogen, non-protein nitrogen, inorganic phosphorus, organic phosphorus, calcium, potassium,

* Presented to the Derbyshire Division, N.V.M.A., at Derby, July 12th, 1932.

magnesium. Forty-two samples of blood were examined, some of these including controls from animals in affected herds, but themselves showing no clinical symptoms.

It would neither be profitable nor practicable here to go into the detailed results of all the findings. It soon became evident that the only constituent which was consistent in its departure from the normal was magnesium. This was invariably less than the normal, and in some instances the amount present was so small that it was impossible to estimate it with accuracy. Hæmoglobin, sodium chloride, calcium and inorganic phosphorus were either normal or diminished in amount. Potassium was either normal or increased. To quote actual figures, the amount of magnesium present ranged from 0·1 mg. per 100 c.c. to 1·16 mg., with an average of 0·39. The relatively high figure of 1·16 occurred in one case only, and can be accounted for by a condition of anhydræmia which was a marked feature in this case. The normal range of mg. in healthy cows was from 1·8 to 3·13, with an average of 1·9 mg. The average amount of calcium found was 9·3 mg. per 100 c.c., the highest being 11·0 mg. and the lowest 5·6 mg. Only two were below 7·9 mg.

Inorganic phosphorus varied from 2·7 to 8·2, with an average of 4·54, as against a normal average of 4·66. Hæmoglobin and sodium chloride, particularly the latter, showed deficiencies of from 5 to 15 per cent.

No biological tests were undertaken. In the light of these findings, an attempt was made to find an explanation for the clinical symptoms. More than a quarter of a century ago Meltzer and Auer showed that magnesium salts had a marked effect in diminishing the excitability of nerve. A 12 per cent. solution of magnesium sulphate applied to the medulla, gave complete abolition of activity of the centres. The subcutaneous injection of about 2·0 gm. of $MgSO_4$ per kilo in the dog, gives complete anæsthesia in about half an hour. (It may be a point of practical utility for you to know that, by the previous intramuscular injection into a dog of 0·8 gm. of $MgSO_4$ per kilo, you may obtain profound anæsthesia with one-tenth of the æther required for light anæthesia.) Now these effects of magnesium are instantly abolished by the injection of a calcium salt. Further, it has been shown that calcium is necessary for the conduction of the impulse from nerve to muscle, and for the passage of the impulse across a nerve synapse. Reduced to simple terms it comes to this, that magnesium and calcium are physiologically antagonistic to one another in their action upon the nervous system. The former inhibits and the latter stimulates its activity. But something more emerges than this. If the above observations are correct, and they have been repeated again and again, it may be deduced that it is the relative proportions of calcium and magnesium which will determine the excitability of the neuro-muscular mechanism. When the ratio Ca/Mg is increased, excitability will be greater, when it is reduced the responses will be diminished. I place, therefore, much stress upon this diminution of the blood magnesium in all the cases examined, because it gives an increase in the Ca/Mg ratio. But there is evidence also that magnesium is necessary for the efficient functioning of the heat controlling centre. Taylor and Winter, and others, rendered dogs experimentally hyperpyretic. They then gave the animals magnesium chloride (0·4 gm. per kilo) by oral administration, and correlated the magnesium content of the blood with the alteration in the body temperature. They found that each 2 mg. increase of magnesium per 100 c.c. serum, was accompanied by 1° F. fall in temperature. It is interesting to note that Sjollema, of Utrecht, working quite independently, has also found a low blood magnesium in the condition which he calls "grass tetany." The symptoms of this disease, as you are aware, are in substance very similar to those of the condition under review this afternoon. He also states that a low blood calcium is a feature in grass tetany, but as the loss of magnesium is greater than that of calcium, the Ca/Mg ratio is raised.

Regarding the etiology of "lactation tetany," we are in the field of speculation, but there are several factors which may be considered. It is well known that an alteration in the relative amounts of the electrolytes in the blood may be of such a nature as to produce tetany. This might occur if there was a diminution of magnesium or of hydrogen ions, or equally if there was an increase in potassium or hydroxyl ions. We have seen from the analyses of the bloods in these cases, that a deficiency of magnesium invariably existed. In many cases there was an increase in the potassium. These factors would tend to produce tetany. Was there any possibility of the hydroxyl ions being increased? The answer is, yes. Some interesting observations were made by Cameron and Carmichael at the University of Manitoba. They observed that the death rate in certain experimental rats was greatest when the barometric pressure was lowest. Investigating this further, they found that the anoxæmia caused by the low pressure produced an increased ventilation of the lungs. This resulted in an excessive loss of CO_2, with a consequent increase in the hydroxyl ions in the blood. It is conceivable, therefore, that the deciding factor in producing the attack on these cows which have died of "lactation tetany," may have been a low barometric pressure.

The diminished content of magnesium in their blood rendered them unstable, and the increase in the hydroxyl ions precipitated the crisis. But what is the cause of the low blood magnesium? To that I can give no answer. Professor Linton, of the Royal (Dick) Veterinary College, has analysed for me specimens of pasture obtained from areas where cases of "lactation tetany" were occurring. The magnesium content was not estimated, but it was demonstrated that there was no deficiency of either calcium or phosphorus, and that the ratio of these elements was normal.

I might make a few suggestions regarding prophylaxis and treatment. It has been shown that invariably there is a deficiency of magnesium in the animal's blood. On the assumption that this is the prime factor in the cause of the symptoms, steps should be taken to prevent or remedy this deficiency. It is well known that magnesium in the form of inorganic salts is absorbed only to a very limited extent from the alimentary canal. However, as a prophylactic measure the occasional administration by mouth of a few ounces of Epsom salt might ensure the absorption of magnesium in sufficient amount to maintain the necessary balance. In addition to this I should be inclined to give the animals free access to salt licks composed of sodium chloride, sodium phosphate and ferric oxide. The last constituent is suggested by the fact that the most severe cases had the lowest hæmoglobin content.

My suggestion of giving mineral licks is, of course, not original. Such have already been recommended by various contributors to the professional journals. I was struck, however, by the claims made for treacle as a prophylactic agent. It was given under the impression that the animals had a hypoglycæmia. Such is not the case, yet treacle seemed to be efficacious. It occurred to me that perhaps this substance was particularly rich in magnesium, and so a specimen was analysed. The result showed that treacle contains 0·24 per cent. of magnesium. No attempt was made to find in what form it was present. It may be, however, that the magnesium in treacle is readily assimilated by the animal. A rough calculation shows that there is enough magnesium in 10 ounces of treacle to more than replace the magnesium deficiency in the blood of a normal-sized cow. Thus it may be shown eventually that the empirical use of this substance as a prophylactic agent may have been justified.

When, however, the animal is actually affected, the more direct method of intravenous or subcutaneous medication must be employed. For this purpose an aqueous solution of magnesium sulphate or magnesium chloride may be used, but these have the common failing that they are not long retained in the blood stream, being excreted by the kidneys.

I have been experimenting with compounds of magnesium, in order to obtain a preparation which is more readily retained in the system than are the above salts, and I have finally settled upon the lactate as being one of the best. The anion is one which is readily attacked and disposed of by the body, and this leaves the cation available to enter into the combination most acceptable to the tissues. Thirty-three gm. of magnesium lactate are dissolved in one litre of freshly boiled, and hot, water. If the salt is of good quality it dissolves completely, and no filtration is necessary. This injection is quite innocuous whether given intravenously or subcutaneously, and no fear need be entertained of sloughing should the vein be punctured.

I have a further suggestion to make regarding the composition of the injection. I observed that by far the greater number of cases showed a deficiency in inorganic phosphorus, and I have evolved an injection which supplies this constituent in addition. The difficulty, of course, was to prevent the formation of insoluble magnesium phosphate. This modified injection is made as follows. Thirty-three gm. of magnesium lactate are dissolved in one litre of hot water, and 8 c.c. of syrupy lactic acid added. To this mixture there is then added gradually, with constant shaking, 25 gm. of neutral sodium phosphate dissolved in 120 c.c. water. The pH of this injection is 5·6; and a trial of it on normal animals shows that it is innocuous, even in doses up to three times that recommended.

Since these injections were evolved, I have had no opportunity of having them tried on cases of "lactation tetany," but I trust that with the coöperation of the members of your profession this may soon be remedied.

It may be within the knowledge of several of you that Sjollema has claimed to effect cures by injecting a mixture of calcium chloride and magnesium chloride. Without clinical trial, I cannot agree to the inclusion of the calcium salt. Physiologically it is contra-indicated. I have already stated my objections to the use of inorganic compounds.

We are busily engaged at the Moredun Institute at present in the investigation of "grass disease" in horses; but when this rush is over a series of observations are to be undertaken in order to determine the relative efficacy of organic and inorganic compounds of magnesium in maintaining the blood content of this element.

Not to speculate at all, hinders advancement, to speculate too widely endangers advancement. I have tried to steer a middle course, and I hope I have succeeded. I leave the matter now in your hands, for a free and frank discussion.

Discussion

Mr. J. R. Barker (Hereford), in opening the discussion, said he was delighted to have had the opportunity of listening to such an excellent description, red-hot from the laboratory, of a disease that was giving veterinary practitioners no end of trouble. He did, however, dislike the term "lactation tetany." Rather than tetany, he thought the condition was convulsion. The culminating point in the clinical symptoms was convulsion, but this might be preceded by tetany, and it was sometimes difficult to know it would lead to convulsion or milk fever. His experience of this sort of thing went back to when he was a boy at home with his father, and he found that lactation tetany occurred in the puerperal period or in the period of œstrus. A few years ago he began to have a lot of these cases, and he used to give magnesium sulphate, chloral hydrate and potassium bromide. He was called to see 50 or 60 cows, and he diagnosed what is now called lactation tetany. He lost quite 40 of them. As they did not respond to ordinary treatment, he resorted in a moment of despair to what he might call a blunderbuss method. He inflated the udder with air, gave sodium chloride and formalin per stomach tube, and injected camphorated oil subcutaneously. The result was much better than he expected. If a case was near parturition, he made a point of irrigating the uterus, but it was difficult in the case of a heifer that had never been to the bull. He had looked up the meteorological records to compare them with the dates of his cases, and as a result he was bound to attach some importance to climatic conditions. The lack of sunshine which they had had in Herefordshire during the last two years meant a lack of vitamin D, and cattle had suffered accordingly. When there was a lack of sunshine, there was a lack of phosphates. It was more than possible that the last two seasons had resulted in a lack of magnesium in the grass, because the cases he had encountered occurred in cattle that had never had artificial food and never been housed in their lives. It had been suggested that sodium phosphate would be a good treatment, and he had used it as a drench in the case of animals which he thought had got over their convulsions. He had not had a case since June 1st, which coincided with the return of the sunshine to the pastures in Herefordshire and the return of phosphates and magnesium in the grass. He had clients who had tried everything, and yet had cases of lactation tetany, as it was called, on their farms. He had therefore come to the conclusion that if the meteorological conditions were against one it was not possible to prevent these cases arising. He had administered sodium chloride and treacle by the stomach tube, but the result was often very uncertain. The best explanation he had come across associated the disease with the blood plasma, and how it might lead to tetany was to be found in Macdonagh's work. There was, however, this curious feature, that cases only occurred in female animals. He had never heard of symptoms arising in a bull or bullock. He suggested that the blood plasma of the female at the first œstus suffers some alteration, and for the rest of her life is never the same. That was nothing more than speculation on his part, but at least it was worth considering.

Mr. W. Irons thought it likely that certain plant poisons affected cattle, but it was nevertheless strange that it should only affect females. Poor pasturage in the last year or two, due to absence of sunshine, had forced cattle to seek food in the hedge bottoms, where nightshade, foxgloves and other deleterious herbs abounded. That was, he suggested, another line of investigation.

Mr. J. O. Powley, answering this latter question, said that in 1923, on behalf of the Ministry of Agriculture, he investigated a number of cases that were reported in Herefordshire, and he took the precaution of calling in a botanist. He reported that he could find nothing particular in the herbage to account for the disease, as he found no poisonous plants in the hedgerows. When he first saw the disease, he thought it was what the old practitioner used to call stomach staggers. He believed that climatic conditions had much to do with it. There was another condition called bracken poisoning. You might feed cattle on bracken, and sometimes, without warning, four or five animals would go down and present all those symptoms of what was now called lactation tetany.

Mr. T. Hacking, speaking as an agriculturist, said it had been a pleasure to listen to Dr. Dryerre's interesting paper, which had cleared up many points that had puzzled him. The disease had been pretty rife in Leicestershire, and everyone was greatly concerned as to the cause. The County Council had made representations to the Ministry, urging that the matter should receive the special attention of those engaged in research work. Enquiry had also been made among veterinary practitioners, and the information obtained coincided with what he had heard that afternoon—that the disease occurred in cows at some varying period after calving. That barometrical pressure had something to do with it was also confirmed, but on the question of magnesium deficiency he might state that in his experience of agricultural work there was practically no response to magnesium dressing in crops.

Mr. O. V. Gunning said he found it difficult to distinguish lactation tetany from the old-fashioned stomach staggers, but the disease seemed to present different symptoms in different districts. In his own district, *post-mortem* examinations showed an acutely inflamed stomach. He had also found an acutely inflamed bowel, and if not, there was inflammation in little red patches. The disease, in his experience, had not always been fatal, and nearly every animal that died he had proved to be tuberculous. Those he had lost had died on their side, and he found if he could get an animal on to its brisket it had a better chance of recovering. With regard to treatment, he was not sure that in acute cases it was not best to do very little.

Dr. G. C. Fraser said he had listened with great interest to Dr. Dryerre's paper, presenting the case for a magnesium deficiency as the cause of of grass tetany. He would like to put forward the suggestion that this was a braxy-like disease. Dr. Turner, of Australia, who did such a fine piece of work in proving the cause of black disease, mentioned five characteristics of braxy-like diseases—(1) a predeliction for the best conditioned animals, (2) high mortality with few or no premonitory symptoms, (3) rapid decomposition after death, (4) definite seasonal incidence, and (5) they all appear to be related to the presence of an anærobe. Each of these conditions agreed with his (Dr. Fraser's) experience of grass tetany. The anærobe in this case was probably the *Vibrion septique*, which had been isolated in a strain of high toxicity from the area of the blackened muscle, in several cases very shortly after death. He did not want to

suggest that infection by *Vibrion septique* was the primary cause of the disease. He rather believed that toxins of this, and possibly other organisms present in the intestines, were responsible for many of the symptoms and might be the cause of death. They must first discover the primary lesion, and then the cause of the primary lesion had to be traced. Was the enteritis of the small intestine the primary lesion? They had a close parallel to this disease in the "struck" enteritis of Romney Marsh sheep, in which death occurred after symptoms resembling those of grass tetany. The cause of death had been proved by McEwen and Roberts to be a toxin produced in the small intestine. If the enteritis was the primary lesion, what caused the enteritis? Was it the presence of the anærobic organisms, or were the anærobic organisms normally present given a medium in which they could proliferate and produce their toxins? If so, what was the cause of the alteration in the cow's system that allowed this? Possibly an alteration in the mineral constituents —a mineral deficiency. He did not wish to disparage those who took the view that the disease was one of the mineral deficiency group, nor did he wish to discourage work on the cure of the disease on those lines. At the same time, he would like to suggest the possibility of a line of treatment which might break the chain of events at another link—to be precise, the possibility of treatment by vaccination. Dr. Fraser went on to refer to a vaccine which he had used on some hundreds of cows this spring. The result had been very pleasing, but whether that was due to good fortune or to actual prophylactic success it was too early to determine.

Mr. R. Garland said that, as a farmer, he hoped Dr. Dryerre and his fellow workers would be successful in their campaign against this disease. He would like to know whether there was more magnesium on strong land than on light land. There was a tendency to blame the pasturage, but he did not think it was grass poisoning, because he had heard of cases in which the cattle were stall fed.

Mr. G. V. Tyerman stated that his experience was similar to that of Mr. Barker. Nearly all his cases were in cows that had not long calved. He met with it on high land and low land, in good pasturage and poor, and among fat cattle and lean. He believed that climatic conditions had much to do with the trouble, producing changes in the pasture, and bringing up herbs which would not otherwise be there.

Mr. A. McVicar observed that, as a layman, he could not help wondering whether all the speakers were referring to the same disease.

Mr. George Eaton said he had known the disease under various names, but had not met with it to any extent until recently, when he had over 100 cases. Lactation tetany varied in degree from those cases showing staring eyes, walking stiffly behind, to the very advanced and rapidly fatal cases. The exaggerated movements performed by an animal in an acute attack were extraordinary, and the excessive flexion of the joints and elevation of the limbs somewhat resembled a slow-motion picture of a hackney in the show ring. Except for the hyper-acute cases, which go into convulsions and die in a few minutes, he regarded lactation tetany as a disease which yielded to treatment, and he knew of no other condition which yielded such spectacular recoveries. Inflation of the udder of a nervous cow was by no means an easy task, but it could nearly always be accomplished with a little patience. He considered it was courting disaster to attempt to drench an affected cow, but later he had found sedatives, such as chloral hydrate, a useful adjunct to other treatment. The cow should be kept in, and the feeding improved. He had given sterilised bone meal with advantage. Rightly or wrongly, he attributed the disease to a mineral deficiency, due to abnormal seasons, poor hay and indifferent herbage.

Mr. T. Hicks said he had been unlucky enough to see a good many of these cases, but not until this spring. A farmer asked him to certify in one fatal case that lightning was the cause. He refused, but the farmer got a certificate somewhere else and was paid by the insurance company. In the majority of cases, the patient was either dead before he arrived or died very soon afterwards, but he had had a few recoveries.

Mr. J. C. DeVille remarked that however much they might differ as to the proper name of the disease, it was of little consequence. The vital questions were, what caused it, and what was the best treatment? He always stuck to inflation, and he agreed that it was most important to get the animal on its sternum. He always injected calcium, and he did not drench. He thought it unwise to drench when the animal was so distended.

Mr. H. S. Cockburn agreed that there were different types of the disease in different parts of the country. He had never found any rise in temperature, and had even found the temperature to be sub-normal. Conditions pointed to something in the pasturage being the cause of the trouble. He had always noticed, in *post-mortem* examinations, that nearly all the organs were terribly congested.

Mr. E. Wilkinson said he found the best thing to do was to put a rope round the horns and keep the animal straight up. He had given calcium, and some got better while others died. Now he believed that if he did little else but keep the animal quiet and upright he got better results.

Mr. L. A. Auchterlonie said that in fatal cases to which he had been called the farmer admitted that he had noticed certain symptoms overnight, and the convulsion only came on at the last. A *post-mortem* examination invariably showed inflammation of the stomach and intestines. He was inclined to share the view of Mr. Barker that the cause of the trouble was a vitamin deficiency, upon which the absence of sunshine had considerable bearing.

The Hon. Secretary (Mr. Ironside) read the following letters on the subject from absent members:—

From Captain J. Godber, M.R.C.V.S., Halam, Newark:—

"During this spring I have met with 25 cases of this condition, the number being greatly in excess of any previous year. All the cases occurred during the month of May and the first week in June. I have not seen a case since June 8th.

"In about 95 per cent. of the cases the subject had had four calves or more, *i.e.*, was at least seven years old or older. I had only one case in which the subject had only calved her third calf and none under that age. In nearly every case the subject had been calved from six to eight weeks. This is a very interesting and important point, to my mind, because milk records show that a cow reaches the maximum yield of milk, in nearly every case, about seven weeks after parturition.

"I do not think there is the slightest doubt that the disease is allied to milk fever and due to calcium deficiency, because this deficiency would be most marked in cows which had been

in milk for several years, also it would be at the maximum when the cow's yield of milk was the highest. Another point is that a cow whose maximum milk yield occurred during the month of May or early June would yield more milk than a cow whose maximum yield occurred at any other period of the year, and it would follow that the calcium deficiency would be greater.

"Symptoms have varied considerably in the degree of acuteness, but all have pointed to cerebral irritation and excitement. In five cases the subject was dead or in a dying condition on my arrival, but in all these cases my questioning elicited the fact that the animal had not been really normal for several days. In most cases the owner stated that the animal had been slightly stiff in her movements and her appetite had not been quite as good as usual. Quite suddenly the animal went down, had all the symptoms of being in a continuous epileptic fit and died within a short time.

"In other less acute cases the symptoms have been fairly similar—vision affected, movements inco-ordinated and exaggerated. In some cases the animal, in addition to staggering gait, etc., continuously protruded the tongue. In all cases the subjects are hypersensitive to sound and light. In fact, except in the very acute cases, the symptoms are practically similar to those of milk fever.

"Concerning treatment, out of the 25 cases which have come under my observation 15 have recovered. I have treated all cases in the same way as I treat milk-fever cases, *i.e.*, inflation of the udder, with injections (either subcutaneously or intravenously) of calcium dextrose. Some cases have responded almost at once; in a few hours the animal's general condition has been normal and no relapse has occurred. Other cases have taken several days to recover, but I feel satisfied that it is the only treatment likely to give satisfaction. And I believe that in the very acute cases I have mentioned, if similar treatment had been given in the early stages the animals would in all probability have recovered."

From Mr. W. A. Dickinson, M.R.C.V.S., Crowland, Peterborough:—

"In response to a request by the Secretary of our Division (Lincolnshire and District), I am writing on the subject of lactation tetany in cows. I am afraid I can be of little help.

"One feature has struck me very forcibly, *viz.*, the tremendous increase of the cases in the last eighteen months or two years. Whereas formerly I very rarely met a case, they have recently become comparatively common.

"I formed the opinion that it was a deficiency disease, but could not associate it with a calcium deficiency, comparing it with milk fever, for all my cases have died in a very few hours, generally from two to six hours after onset of symptoms, and there has never been any sign of coma. I have tried injections of calcium, but to no purpose; in fact, I feel perfectly helpless in dealing with them.

"In most instances, a single cow has died and no others before or after, but on one farm two died within three weeks, and in that district, a group of small holdings, I have lost four—one last July, the two mentioned above this spring, and one other this spring. In September, 1930, I had a peculiar outbreak among cows, symptoms exactly like these. In a week six cows died, and then no more for six months, then one died. I could come to no conclusion as to cause of death, in spite of analyses, *post-mortem*, etc.

"If Dr. Dryerre can succeed in getting to the cause of this disease, and in discovering a treatment for it, he will confer a great benefit on those members of our profession who, unfortunately, have to deal with it."

The President (Mr. H. W. Steele-Bodger), bringing the discussion to a close, voiced the opinion of those present when he said it had reached a high level and was a tribute to the excellent way in which Dr. Dryerre had dealt with the subject. He could not agree with the statement that lactation tetany yielded spectacular recoveries. It was a troublesome disease, and caused the veterinary practitioner much anxiety. The first case he saw he mistook for milk fever, and when he visited next day the cow had died from convulsions. He could not help thinking that some of the speakers had been talking of different diseases. His own cases had shown varying degrees of temperature, and, as in the experience of Mr. Cockburn, many of them had been sub-normal. As to treatment, he did not think it mattered much what one gave. He felt sure that many of the animals recovered in spite of the treatment rather than because of it.

THE REPLY

Dr. Dryerre's reply to the discussion was brief, owing to the lateness of the hour, and he first expressed his appreciation of the interest shown in the subject. He was particularly grateful for the helpful opening by Mr. Barker, whose remarks were not so much critical as supplementary of what he had himself said. Mr. Barker was able to give them the clinician's point of view, while he (Dr. Dryerre), with the limitations to his veterinary experience, was able to speak only from the standpoint of the bio-chemist. It was true that the pasturage varied at different times of the year and under different climatic conditions. He agreed with Mr. Barker's theory that the trouble might be due to changes in the blood plasma, but they had still to discover what those changes were. On the question of the magnesium content of the soil in the affected areas, and also as to whether it abounded more in strong land than in light land, he had to admit that he did not know. At the present time, he was working on grass disease in horses, and he welcomed some of the hints that had been thrown out on the subject of pasturage. What had interested him most perhaps was Dr. Fraser's contribution to the discussion, and especially on the possible effect of vaccination. He admired his caution in not coming to a hasty conclusion, and he would like to enter into correspondence with Dr. Fraser, to their mutual advantage, if that gentleman was agreeable. He shared the view that the disease was not due to any specific type of pasture, but it was a possibility which he was not yet prepared to rule out.

He was of the opinion that a vitamin deficiency might be a contributory factor. Both vitamins A and D depended upon sunshine for their production in the pasture. A deficiency of A rendered the mucous membranes less resistant to infection, whilst a lack of D altered the reaction of the intestinal contents in the alkaline direction. Thus, in addition to the increased vulnerability of the animal, there might be a coexistant alteration in the bacterial flora of such a nature as to cause the disease. This should be capable of demonstration by the bacteriologist.

He had had blood samples sent to him of supposed lactation tetany, and he had found it had been milk fever, and for that reason he rather thought that some of the speakers that afternoon had been talking about milk fever and not lactation tetany. This latter disease had been observed in Scotland, and that was how he had become

"HOW ANIMALS BEHAVE"

Mr. Rex Knight's Further Reply to his Critics

In the hope of being able to secure the full text of Mr. Rex Knight's much-criticised address on the above subject to the Psychological Section of the British Association for the Advancement of Science, we approached him for a copy. In reply, we were favoured with the following letter, in which Mr. Rex Knight takes the opportunity to amplify the reply to his critics recently published in *The Times*.

As from:
The Dept. of Comparative Psychology,
The University,
Aberdeen.

September 12th, 1932.

Dear Sir,

I thank you for your letter of September 6th, which has only just reached me. I am afraid I have no complete record of my address to the British Association, for it was given from notes. However, I am sending you a copy of the summary which the British Association's press bureau circulated to the papers. Naturally, it omits a great deal (since my address occupied three-quarters of an hour)—it refers to only a fraction of the instances of animal behaviour that I considered, and it contains no mention of that part of the address which dealt with the fact that, though some animals have vocal organs very similar to our own, they have no language in the sense of the verbal expression of judgments (you know, of course, Descartes' view—that animals do not speak, not because they lack the apparatus for speaking, but because they have nothing to say!).

Many newspapers have made me deny that animals have minds. This is a complete mistake—a misrepresentation of my view. I believe that animals have minds corresponding to the complexity of their brains. The purpose of my paper (as I have said in the letter which *The Times* published this morning) was, *not* to deny that animals have minds, but to examine those arguments for animal minds which are based, not on comparative physiology, but on observations of animal behaviour, whether inside or outside the laboratory. Lloyd Morgan, Köhler, and Sir Arthur Thomson all believe that some actions of animals cannot be explained except on the assumption that they are caused by the animal's mental experiences. I sought to show that "whether there are animal minds or not (and I believe that there are), animal behaviour can be explained without reference to them."

Yours faithfully,
Rex Knight.

W. Brown, Esq.,
Editorial Representative,
National Veterinary Medical Association.

. . . . .

In his letter published in *The Times* of September 12th, Mr. Knight says:—

"In reply to the letter of the Hon. Gilbert Coleridge in your issue of to-day, may I point out that, in my paper to the British Association, I did not deny that animals have minds? As your own report shows, I expressly said that:—

> On general evolutionary grounds it is unlikely that animals are mere automata. They probably had minds corresponding to the complexity of their brains.

"I added that we shall get to know something about animal minds when we know more about the relations between mind and brain in man and about the similarities between human and animal brains.

"The aim of my paper was to examine those arguments for animal minds which are based, not on comparative physiology, but on observations of animal behaviour, whether inside or outside the laboratory. I sought to criticise the cogency of the evidence which is alleged to show that some actions of animals cannot be explained except on the supposition that they are the result of recollection, reasoning, planning, or some other mental experience.

"No doubt animal behaviour, as in the case of the eagle quoted by Mr. Coleridge, sometimes seems to exhibit forethought and purpose. But we must guard against reading our own mental experiences into animals' actions, and we must avoid thinking that, because an action in fact secured a particular result, therefore the animal consciously foresaw and aimed at that result. People seeing my cat pull the stirrup that opened the door of her box might naturally suppose she pulled it because she grasped the causal connection between the pulling of the stirrup and the opening of the door. But that her behaviour was not in this sense 'intelligent' is shown by the fact that, when the stirrup was moved, the cat still clawed the air in the place where it had been."

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involved in this work. He was anxious to ascertain whether the conditions in England were comparable with the conditions in Scotland. His sphere of labour, however, was Scotland, but as there were not sufficient cases in his own district he had welcomed the specimens of blood sent in from farther afield. He had come to Derby primarily for information, and to hear the views of English veterinary surgeons and farmers, and in that respect he was pleased to think his journey had not been wasted. The bio-chemistry of magnesium had not been worked out very fully yet in regard to its application to the life of the animal and the life of the plant. There was a good deal of groping to be done yet.

Summary of the Address

We reproduce below the circulated summary of his address to which Mr. Knight refers:—

Most people believe in animal minds. Everyone tends to think that his horse or his hound, his cat or his canary, his Pekingese or his parrot, has some degree of character and intelligence. But is this belief one which we can justify?

When the plain man is challenged, he usually points to the differentiation which the behaviour of animals often exhibits. He tells of the cat that will sleep only on one particular cushion, of the dog that looks only to its mistress for sweets, and of the hunter that neighs when it sees a red hunting coat but is entirely unmoved by a lounge suit. And we are asked to agree that in all these cases the animal "knows."

But this line of argument does not lead to animal minds. The fact that a dog or a horse responds differently to two different stimuli does not prove that it consciously distinguishes between them, or that it has any kind of mental experience.

After all, a sea anemone will accept its proper food and reject pellets of paper, and a decapitated earthworm will keep away from places where it has been hurt. Again, if you put acid on a frog whose brain has been completely removed, it will scratch just the spot that you touch, and if you increase the strength of the acid, the frog will scratch correspondingly harder. And even a wireless set will respond differently to different wavelengths. So we find no evidence of minds in animals here.

Some people see signs of mind in the way animals seem to remember. They refer us to the dog that jumps all over its master when he comes home after a holiday, and to the vindictive elephant that soused the man who had 20 years before stuck a pin into its trunk.

"Remember," however, is an ambiguous word. We can remember what we did on Easter Monday, and this kind of memory does involve mind and conscious recall of the past. But we can also remember how to swim or to ride a bicycle, and here mind need not enter at all—by saying that we "remember" we mean merely that we have acquired and retained some bodily habit.

Now, it is perfectly certain that animals acquire and retain bodily habits, but there is no clear evidence that they ever recollect or recall things—that they have memory in any mental sense.

The dog that jumps over its master may not consciously recognise him at all. The dog's previous association with its master has left traces in its brain and nervous system, and these purely physical traces do affect the dog's present behaviour. But it does not follow that the dog is mentally remembering anything.

Another argument for animal minds is based on the fact that animals can be trained. We have all seen at a circus how horses, elephants, and even tigers, can be taught quite complicated tricks. And much training of animals has been carried out under scientific conditions.

A pike, for example, has been trained to stop snapping at minnows by placing it in a tank where it was separated from the minnows by a glass partition. Because it stubbed its nose whenever it went after the minnows, it came to desist from chasing them even when the glass partition had been removed—it would swim to the place where the partition had been and then turn alongside as if the partition were still there!

CONDITIONED REFLEXES

Porcupines, too, which normally take food straight with their mouths, have been trained to use their "hands," and to put out the right hand for cabbage and the left one for carrots. And rats have been taught to find their way without error through all sorts of ingeniously constructed mazes.

But what do all the experiments on the training of animals show?

Merely that animals can be brought to respond in particular ways to particular stimuli.

There is no evidence of mental activity in the fact that an elephant, in response to definite signs from its trainer, dances the fox-trot, or in the fact that a sheep dog, likewise responding to cues, carries out manœuvres with sheep. It may be all a matter of conditioned reflexes—of altering and adjusting the animal's inborn ways of behaving. The training can be quite well explained on the hypothesis that animals are nothing more than reflex machines.

It was the great Russian physiologist, Pavlov, who first made plain the fundamental part which conditioned reflexes play in all the behaviour of animals. Starting from the fact that, when a dog is given a piece of meat, its mouth waters, he showed that this inborn reflex can be controlled in various ways. If, for instance, you ring a bell every time the dog is fed, eventually the mere ringing of the bell, in the absence of the meat, will suffice to make the dog's saliva flow.

This is an example of a conditioned reflex—of the physical mechanism that underlies and explains animal training.

In my own laboratory we experimented on the training of cats, and found abundant evidence of conditioned reflexes. The cats' learning was shown to consist merely in the formation of habits. "Reflex," as one of the cats came to be called, was each day shut up in a box which she could open only by pulling a stirrup that was attached by a cord to the

bolt on the door. Whenever she succeeded in getting out, we gave her milk.

"Reflex" did learn to pull the stirrup.

On the first occasion that she was put in her box, she took over half-an-hour to get out, but later she took only a second. Moreover, as cats go, she was exceptionally bright. Nevertheless, when the stirrup was moved from the front of the box to the back, she did not go and pull it but stupidly clawed the air in the place where it had previously been.

And in the end poor "Reflex" became such a creature of habit that, even when she was placed beside the milk outside the open box, she would not touch it until she had needlessly run into the box and pulled the stirrup! There was no evidence of intelligence there!

Even the cleverest animals, like monkeys and elephants, do not reveal any mental activity when they are confronted with practical problems.

Professor Holmes gave his monkey, Lizzie, a loosely-corked bottle containing a peanut. Lizzie at once pulled out the cork with her teeth, obeying the instinct to bite at new objects, but she never learned to turn the bottle upside down and let the nut drop out.

Similarly, Peter, the performing chimpanzee, could skate and cycle, thread needles and untie knots, smoke a cigarette and string beads, but his learning, too, was mere habit-formation. And even the barber elephant that has been trained to "shave" another elephant, holds the mirror in front of his customer's face the wrong way round!

Among the higher or "big-brain" animals, just as among the others, learning seems to proceed by trial-and-error.

There is no evidence that they learn by ideas, or that they experiment and plan with mental pictures in their head. Even the cleverest of them are baulked by a practical problem that a young child could quickly solve.

Of course, on general evolutionary grounds it is unlikely that animals are mere automata. They probably have minds corresponding to the complexity of their brains. We shall perhaps know something about animal minds when we know more about the correlation between mind and brain in man, and about the similarities between human and animal brains.

Meanwhile, however, we must reject invalid arguments based on the facts of animal behaviour. Whether there are animal minds or not, there is no need to postulate them in order to explain how animals act.

In 1931 there were 22,975,000 milk cows on farms in the United States, representing an average production for each cow annually of between 4,500 and 5,000 pounds, or between 562 and 625 gallons of milk. Each cow represents an average value of $90·05 a head.

Clinical Communications

CÆSARIAN SECTION IN A PEKINGESE BITCH — A RAPID RECOVERY

H. J. LOVELESS, M.R.C.V.S.
Clacton

Subject.—Pekingese bitch, three years old, in whelp for the first time.

When I was called in the bitch had been in labour for 48 hours and was almost exhausted. On examination, the pelvis was found to be deformed and delivery of the fœtus impossible.

I hurried the bitch back to my surgery and on account of her collapsed condition a very guarded prognosis was given.

On opening the abdomen a quantity of blood-stained fluid escaped, indicating that peritonitis was commencing. Cæsarian section was carried out in the usual manner under chloroform, and a rapidly-decomposing fœtus removed.

The uterus was sutured by a single row of Czerny Lembert sutures, with the finest silk and a milliner's needle, the muscles and peritoneum (together) with a single row of silk sutures, and the skin with a single row of silk sutures (silk is much easier to use than catgut, although the latter is absorbed in time, silk remaining encysted).

In 24 hours the bitch walked out of her basket and seemed to be reviving considerably. Progress was rapid; the wound healed by first intention, the stitches being removed on the fifth day.

This case goes to show us we should always give every chance to our patients and never shirk an operation, even if conditions seem nearly hopeless.

I would like to add here that in my experience of abdominal surgery Cæsarian section is not so risky to the patient as is Porro's operation.

* * * * *

SARCOMA OF THE JAW*

N. H. BROOKSBANK
Royal Veterinary College, London

Subject—a six-year-old shire gelding. The owner stated that a swelling had appeared on the lower jaw a few days previous to our being called in.

On thorough examination a hard dense swelling, about the size of a hen's egg, not very painful to pressure, was found on the left horizontal ramus, on the inner aspect. The mouth was examined but no dental trouble could be detected.

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* Case in series presented for award under the N.V.M.A. Clinical Prize Scheme for Students, 1931. Four figs. in original.

A mercurial blister was applied to the swelling and progress watched. By the end of a fortnight the swelling had doubled in size and seemed to have extended more toward the outside of the ramus. It appeared to be of a hard bony consistence, with the exception of a few soft spots, and on hard pressure a slight crepitation was heard. A small amount of blister was rubbed into one of the soft portions on the lowest part of the protuberance to encourage abscess formation.

The animal was seen three days later, when it was found that mastication was performed with difficulty; the horse was salivating profusely, with the tongue hanging out at one side of the mouth. A suppurating centre was opened and a large quantity of fœtid pus was evacuated. On exploring the cavity with the fingers a considerable number of splinters and sharp-edged pieces of bone were felt. Some fragments of bone were removed and the cavity dressed antiseptically.

It was now suspected that the jaw had at some time been fractured. The dressings were repeated for a few days, more bone being removed daily, but discharge still continued. Eventually the first and second pre-molar teeth appeared loose and were extracted. During this period the lower lip became thickened and the body of the mandible enormously enlarged.

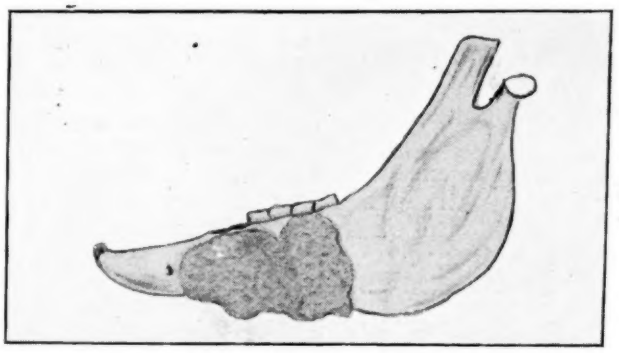
The horse was cast and chloroformed in order that all the necrosed bone could be removed, but on exploration it was discovered that the jagged edges of bone which had been felt adhered too firmly to the jaw to be extracted in any quantity.

When next examined the submaxillary lymph glands were found to be indurated and much enlarged. This last item of clinical evidence, together with the loosening of the pre-molar teeth and the great proliferation of bone, now led us to suspect the presence of actinomycosis.

Some of the tissues from the lesions were taken away and sent to Dr. A. L. Sheather for microscopical examination for streptothrix. In his report Dr. Sheather stated that he was unable to find any streptothrix present. A few days later a further sample, together with portions of the submaxillary lymph gland, were sent, but Dr. Sheather's report was again negative to streptothrix.

By this time the case had been under treatment for some weeks, and, as the animal was very debilitated and not feeding, it was decided to destroy him.

On *post-mortem* examination samples were taken from the old tissues around the jaw, and also the whole of the posterior section of the submaxillary gland, which had become thickened and indurated, and these were sent to Dr. Sheather. The jaw was boiled and the left ramus also sent to him.



Drawing of Left Ramus

The following is an extract from Dr. Sheather's report.

". . . I have now been able to examine sections from a number of different parts of the glands from the horse which I received from you on the 7th instant, and I find that the lesions are round-celled sarcomata. I think it is probable that the primary growth originated in connection with the periosteum of the jaw. In the small pieces of muscular tissue which were attached to the glandular masses I was able to find a large number of small growths about as large as sago grains and resembling them in appearance. These, like the larger masses in the glands, were round-celled sarcomata. In some places the picture presented was a little complicated, because necrosis of the tumour tissue had taken place. This, I think, was due to bacterial infection from the primary lesion, which, I have no doubt, originally became infected by bacteria as a result of ulceration.

" It is interesting to note, although it is of no clinical importance, that sarcosporidia were present in the muscular tissue of this horse. It is, I think, the first time that I have seen the sarcosporidium in the horse.

". . . The sarcoma was evidently one which, instead of remaining limited to the periosteum, as is sometimes the case, had invaded the bone tissue and caused the bony proliferation which is so well shown. The German description says that in such cases the softer tissues are gradually invaded and that secondary growths make their appearance in the lymphatic glands in the neighbourhood, and sometimes in the lungs. . ."

In his annual report, Dr. W. E. Roper Saunders (the Medical Officer of Health for the Rowley Regis (Staffordshire) district) states that he is of the opinion that general medical practitioners could give better help in securing a satisfactory milk supply for the country as a whole if they would energetically recommend the really satisfactory graded milks, which are certified, grade A (T.T.) and grade A (pasteurised), instead of loose and sterilised milks. He regrets to say that no advice on this point appears to be given as a rule to patients.

Report

[**The Pig Industry.** A Report on Conditions in Great Britain and America, with Suggestions applicable to Australia. By R. B. Kelley, B.V.Sc. Published by the Council for Scientific and Industrial Research of the Commonwealth of Australia. Pamphlet No. 28.]

Mr. Kelley was in the United States when the Queensland Pig Industry Committee asked for an investigation into pig production in that state, and as a result Mr. Kelley was asked to collect information from as many countries as possible, and the Report now produced embodies his conclusions. In his introduction he stresses the remarkably low pig production in Australia, the swine population being as low as one million, whilst the consumption of pig products is equally low. Exports are also negligible, Queensland being the state chiefly concerned. The second part deals with the populations and consumption of pigs in various countries, the U.S.A. holding the world's record for production, with Canada leading in consumption of pig products. America produces within her own borders practically all the necessary feeding stuffs for pig rearing, and although her home consumption is high, she is able to export a surplus overseas. In dealing with possible markets for a future Australian surplus, England is regarded as about the only importing country, with requirements for fresh pork and bacon chiefly, the lard imports being an American monopoly.

Part three of the Report goes on to state how the requirements of the English market are at present being met, and deals with the countries supplying that market, and the type of product, as well as the different types of home trade. The fourth part discusses the possibility of an export trade from Australia, and mention is made of some factors favouring this export trade, among which the following are prominent in favouring the Australian exporter:—

The Embargo on Continental Pork, of 1926.
The fact that freezing is not a hopeless handicap.
The apathy of the British farmer to produce sufficient pork for his own market requirements.

Mr. Kelley realises that the English market may not be continuous, and I think Australian pig producers would do well not to gamble too much on an everlasting open market for their products in England. It is true that up to the present England is the "happy dumping ground" of almost the whole world, as far as pig products are concerned, but there is evidence to show that the traditional apathy of the English farmer is about to break down under the combined pressure of economic conditions, Government action, and the demands of the bacon curers. English farmers are already giving up the idea that they can breed any type of pig they fancy, and are at last taking note of the requirements of commerce. Although this process is slow, nevertheless it is taking place, and once the whole of the English farming community realises that it can produce enough pigs for the home market, then the hopes of Australian exporters will be dashed to the ground.

Part five deals with the standardisation of types suitable for export, and in advocating a standard type of commercial pig Mr. Kelley is on firm ground—it is to be hoped the Australian farmer will take due note of his remarks. Mr. Kelley mentions the Large York and Tamworth breeds as being eminently suitable for bacon production. Bacon curers in England, who are also large breeders, prefer a pure Large White (or Large York as Mr. Kelley calls them) or a cross Large White with a Welsh pig, as this cross-breed gives a good long side of bacon. The writer some years ago carried out an investigation into the numbers of pairs of ribs in various British breeds, and found that the Welsh and Large White gave from 15 to 17 pairs to the 14 of the Tamworth. Moreover, by breeding from two "white" breeds there is no danger of "seedy cut" appearing.

Part six deals with production of the export type, and there is an excellent chapter on breeds and breeding, on the feeding of pigs for export production.

Part seven refers to abnormal and pathological conditions affecting production costs, and in this case Mr. Kelley refers to other countries which are penalised by the incidence of diseases unknown in Australia, *e.g.*, swine fever, foot-and-mouth disease, etc. There is a good chapter on deaths at birth, small litters, and deaths soon after birth, in which the various possible causes are discussed fairly, although most of his information in this respect seems to be derived from American and Continental sources: he does not seem to be aware of the good work done at the Rowett Research Institute, Aberdeen, to mention only one British institution. This is especially the case regarding paralysis in pigs. In referring to "seedy belly," or what is termed by English curers "seedy cut," he mentions that the condition is common in black pigs, whilst it should be stated that it is also common in the progeny of black and white breed crosses, where the black boar is crossed with a white sow.

The chapter on soft pork makes no mention of that bugbear of all bacon curers, fish meal, with its resulting "taint" of the bacon.

The condition of "yellow fat" in Queensland pigs is also mentioned, nothing quite comparable to it being found in American pigs, and it is

apparently associated with grazing. This condition should possibly disappear when Australian farmers go in for intensive feeding of their pigs for commerce, as "grazing" is hardly likely to come into such a system, *i.e.*, if the farmers are anxious to produce a finished pig in as short a time as possible.

In his conclusions Mr. Kelley assumes that "England promises to remain the only overseas market available for any great quantity of Australian pig products." As has already been pointed out in this review, this assumption may be rather misleading, especially in the event of the reports of the British Pig Industry Council being acted upon.

Not the least interesting part of the Report is the photographs of various breeds of pigs, showing the evolution of the present type of commercial breed from the heavy fat type of pre-war days.

In a foreword to the report it is stated that Mr. Kelley was asked to collect as much information on the various matters as he could in the somewhat limited time available to him. Mr. Kelley is to be congratulated upon the way he spent that time, as he seems to have collected a mass of interesting information from all over the world, and combined the whole in a pamphlet of 43 pages. Although the pamphlet is intended for Australian consumption, the amount of material information on the subject of pigs contained within it is so great and valuable that one can with every confidence recommend it to all who are interested in the pig industry and agriculture.

D. J. A.

Abstracts

[Presence of tubercle bacilli in milk sold in Bogotá. (Trans. title.) Thesis presented by M. G. Rueda. Escuela Nacional de Med. Veterinaria, Bogotá, Columbia.]

This paper is interesting in that it demonstrates the simultaneous advance of human and bovine tuberculosis in Columbia, a comparatively new and recently developed country.

Twenty years ago human tuberculosis was rare in Bogotá and a case encountered in the high altitudes was looked upon as a rare occurrence. To-day human tuberculosis is as serious a problem in Bogotá as in any European capital, and is responsible for a high percentage of the infantile mortality of the town. In recent years the disease has frequently been encountered in cats, dogs and monkeys. It was only in 1914 that bovine tuberculosis made its appearance in the abattoirs of the country, but cases are now frequent. The presence of virulent tubercle bacilli has been demonstrated in 3·1 per cent. of samples of milk sold in the town, and the application of the tuberculin test to 3,000 cattle on the plains revealed a 3 per cent. infection. In some herds the percentage of reactors was as high as 7.

R. S. R.

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[Thrombosis of the Cranial Vena Cava with an enormous Œdema in a Cow. Wyssmann, E. *Schweiz. Archiv. f. Tierhlk.* 1932. Vol. 74, No. 6.]

An old cow with unknown past history, bought from a dealer, developed a progressive œdema of the dewlap, neck, throat and head and in 12 days this had reached considerable size and the head had become very much swollen and was carried low. Besides this there was anorexia.

The pulse was 60 per minute and other marked changes in the respiratory and circulatory systems were lacking. The condition was correctly diagnosed during life and the animal was killed; *post-mortem* examination revealed a thrombus of 15 by 5 cms. in the cranial vena cava.

There was also old-standing tuberculosis of the lungs and bronchial lymph glands, distomatotic cirrhosis and an abscess in the wall of the reticulum caused by foreign bodies.

The vena cava and thrombus were examined bacteriologically and an infection with *B. coli* was found in the lesion. It was therefore decided that the thrombus formation was due to the primary lesion in the reticulum and in no way connected with the tuberculous infection.

An almost identical case reported by Wermuth in 1922 is referred to by the author. Here also the thrombus was assumed to be secondary to an abscess of the reticulum.

J. E.

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[The Stomachworm Disease of Geese, Ullrich, K. *Prag. Archiv. f. Tiermed.* 1932. Vol. 12, No. 3.]

This is an account of a parasitic infestation of young geese caused by the presence of the worm *Amidostomum nodulosum* in the gizzard.

The pathological anatomy of the condition is discussed at length both as regards macroscopic and microscopic changes, and four figures of the parasite are provided.

J. E.

The world is eating less beef, but more pork and mutton, according to official statistics recently issued. Australia and New Zealand consume nearly 250 lb. of meat per head each year, but in Britain, Canada and the United States the quantity consumed is less than 150 lb. per head. About half of our beef supplies and 43 per cent. of mutton and lamb are home-killed, and we produce about 5,000,000 cwt. of pork and import more than double this quantity.

VICTORIA VETERINARY BENEVOLENT FUND

A meeting of the Victoria Veterinary Benevolent Fund was held at the Royal College of Veterinary Surgeons, 10, Red Lion Square, London, W.C.1, on Wednesday, June 29th, 1932, when there were present Professor J. B. Buxton, Mr. J. W. McIntosh and Lieut.-Colonel P. J. Simpson.

In the absence of the President, Lieut.-Colonel P. J. Simpson took the chair.

The minutes of the previous meeting held on April 6th, 1932, having been published in the *Veterinary Record*, were taken as read and signed as correct.

Apologies for absence were received from Dr. O. Charnock Bradley, Lieut.-Colonel J. W. Brittlebank, Messrs. H. W. Dawes, A. Gofton, Major F. L. Gooch, Capt. J. R. Rider, Major C. W. Townsend, and Mr. Woods.

SECRETARY'S REPORT

The Secretary submitted the following report, which was approved:—

New Subscriptions

	£	s.	d.
H. Holroyd (increased by 10s. 6d.) ...	1	1	0
J. Holroyd „ „ ...	1	1	0
Patrick O'Malley		10	6
North of England V.M.A., Proceeds of American Tea given by Mrs. Rider. (To be used for current needs) ...	21	0	0
M. E. Williams (increased by 10s. 6d.	1	1	0
	£24	13	6

Donations

Collecting Boxes—

	£	s.	d.			
Central Veterinary Society	3	5	10			
West of Scotland Division, N.V.M.A.	1	0	3			
				4	6	1
Lancashire Veterinary Medical Association				2	2	0
J. H. W. Masheter				1	1	0
Miss G. M. Muir (per C. Masson) ...				1	0	0
South - Eastern Veterinary Medical Association				2	2	0
West of Scotland Division, N.V.M.A....				4	0	0
				£14	11	1

The donation mentioned above from the North of England V.M.A., represents the proceeds of an American Tea given on June 15th by Mrs. Rider, senr., at Ravenscroft, Beamish, with the help of several other ladies of the Association. The amount includes donations made by members of the Division, evidence that the needs of the Fund are widely appreciated in the North. Mrs. Rider asks that the proceeds should be devoted to current needs.

It was resolved: "That the heartiest thanks of the Council be conveyed to Mrs. Rider and the North of England V.M.A. for their great interest in the Fund and their very welcome donation."

Cases

23. Widow, aged 60. Two sons, 22 and 21, both away from home and unable to help. A report was received on the case and it was resolved to continue the grant of 10s. per week.

104. Widow, aged 49. Keeps late husband's mother; not yet in regular employment. It was agreed that the grant of £1 per week be continued for the present quarter.

144. Widow, aged 43. Two children, 15 and 8. Receiving £2 per week from husband, from whom she is separated. A report on this case submitted by a member of the Ladies' Guild was received and it was resolved that no further grant be made.

153. Widow, aged 53. A letter was received from this recipient thanking the Council for their past assistance. The grant was discontinued.

156. Widow, aged 47. Two sons. Ill and without means of support. The Secretary reported that this applicant was now in hospital and the case was struck out.

156. Member. Ill and in hospital. A report was received from a member of the Ladies' Guild on this case and it was resolved that no grant be made.

163. Daughter of member, aged 72. Receiving Old Age Pension. A report on this case by a member of the Ladies' Guild was received and it was decided to continue the grant of 10s. per week.

Investments.—The question of the Fund's holding of 5 per cent. War Loan was left in the hands of the President and Treasurer.

A prize of 100,000 French francs (worth about £1,136 at the present rate of exchange) is offered by the French Society for the Encouragement of the Dairy Industry for a certain line of dairy research. With the patronage of the French Ministries of Health and Agriculture the prize is offered for the "discovery and practical realisation of an economic and rapid process recognised officially as efficient for the purifying of all the residuary liquids from the various milk industries and its derivatives (serums and purins from piggeries included)."

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An interesting booklet, dealing with a number of their sera and vaccines, has been issued by Bayer Products, Ltd., 19, St. Dunstan's Hill, E.C.3. Many country practitioners will be glad to have particulars of an anti-erysipelas serum specially prepared against infection with swine erysipelas. In view of the risk which is incurred by veterinary surgeons who regularly inoculate pigs with erysipelas cultures, it is a wise precaution to keep a few of these serules in stock in case of emergency. The serum retains its full efficacy for at least two years.

Veterinarians will read with interest particulars concerning the use of "Omnadin" in **human** practice.

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"Ozonair," Ltd., of St. Leonard Street, S.W.1, in a recently-issued pamphlet, describe their special apparatus for the use of ozone in therapy, for which practice there are a considerable number of indications.

The various apparatus illustrated and described in the pamphlet will be on exhibition at the London Medical Exhibition at the New Royal Horticultural Hall from October 17th to 21st, at Stand No. 15.

N.V.M.A. Divisional Report

DERBYSHIRE VETERINARY ASSOCIATION*

DR. DRYERRE AT DERBY MEETING

The large and representative attendance at the quarterly meeting of the Derbyshire Veterinary Association, held at Derby, on July 12th, may be attributed to the unusually interesting nature of the subject on the agenda. This was a paper on "Lactation Tetany," by Dr. H. Dryerre, of the Moredun Institute, and the discussion was opened by Mr. J. R. Barker, of Hereford.

Mr. H. W. Steele-Bodger, President of the Division, occupied the chair, and among those present were veterinary surgeons and agriculturists, not only from Derbyshire, but from the adjoining counties. They included:—

Members.—P. Abson, L. A. Auchterlonie, H. S. Cockburn, Geo. Eaton, J. C. Deville, G. J. Furness, L. B. A. Grace, O. V. Gunning, R. G. J. Lake, T. Ludlow, H. V. Morris, H. McIntyre, H. L. Torrance, E. Wilkinson, and W. J. Ironside (Hon. Secretary).

Veterinary Visitors.—T. Butcher, K. J. S. Dowland, T. Hicks, J. O. Powley, W. L. Sheffield, G. Vernon Tyerman, Wm. Brown, H. Walpole, R. Hudson, and Dr. Fraser.

Agricultural Visitors.—H. Eldon, R. Garland, K. R. Davis, R. H. Dowling, Wm. Irons, T. Hacking, and A. McVicar.

The entire meeting was devoted to the reading of his paper by Dr. Dryerre, and discussion upon it. [Dr. Dryerre's paper, and a report of the discussion, are reproduced earlier in this issue.—Ed., *V.R.*]

At the close a hearty vote of thanks was accorded to Dr. Dryerre and to Mr. Barker for coming to Derby and providing such an interesting and instructive afternoon.

W. J. Ironside, *Hon. Secretary.*

* Received for publication August 11th.

H.M. STATIONERY OFFICE PUBLICATION

The undermentioned has been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses:—London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

	Price Net. s. d.	Post Free. s. d.
Health, Ministry of:		
Public Health. Annual Report of the Chief Medical Officer of the Ministry of Health for the year 1931. (32-3-0-31) ...	4 0	4 4

Municipal Report.

CITY OF SHEFFIELD

C.V.O.'s Report for 1931

In presenting this report it would appear that the Chief Veterinary Inspector of Sheffield has been cognisant of the need for economy, the report, which consists of twelve pages (foolscap), having obviously been economically produced. The staff consists of the chief and two assistant veterinary inspectors. The report is tabulated under various headings, with a very short introductory review of the work performed; however, it is evident to the careful reader that the veterinary services of Sheffield are in the hands of an enthusiastic leader. Especially so is this noticeable in connection with the milk supply and the administration of the Tuberculosis Order, the figures showing that the work performed in Sheffield in this connection compares favourably with that of other cities. It is suggested that if more onus were placed on the producer of tuberculosis-infected milk and power were given to cause an infected supply to be pasteurised until infection had ceased, or for a certain period, farmers would exercise more discretion in the purchase of cows and would be more ready to report suspicion of disease, and thus more progress in the elimination of tuberculosis would result. It is gratifying to learn that the Corporation have established the first tuberculosis-free herd of cows in Sheffield, but since it would appear that cows are slaughtered after the period of lactation and that the herd is not self-supporting, economy is apparently not here the prime consideration, and one is uneasy concerning the future unless, as is suggested, means be taken to make the herd self-supporting.

Seventy cases of suspected swine fever were reported to the Ministry of Agriculture and Fisheries, but only 11 were confirmed. One is intrigued to speculate why this disparity exists.

The number of animals slaughtered in the public abattoir shows an increase of nearly 10,000 over the previous year, while the number of private slaughterhouses in use during the year was reduced from four to two. It is recorded that since the opening of the public abattoir the increase in the amount of meat condemned proves the value of a centralised system of slaughtering.

Sheffield are to be congratulated on being the first local authority to adopt the stunning of pigs by electricity. It was to be expected that Mr. Tweed would favour the trial of any mechanical method of stunning which is likely to avoid the objectionable "splashing" of meat, and it is of interest to learn that the use of this method has proved successful in this connection after daily use under abattoir conditions.

H. E. B.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

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DIARY OF EVENTS

Sept. 26th.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4.30 p.m.

Oct. 1st.—New Five Years' Course, Membership R.C.V.S., comes into operation.

Oct. 3rd.—N.V.M.A. Committee Meetings, 2, Verulam Buildings, Gray's Inn, W.C.1.

Oct. 4th.—N.V.M.A. Committee Meetings, 2, Verulam Buildings, Gray's Inn, W.C.1.
N.V.M.A. Council Meeting, 10, Red Lion Square, W.C.1.

Oct. 5th.—R.C.V.S. Committee Meetings.

Oct. 6th.—R.C.V.S. Committee Meetings.

Oct. 7th.—R.C.V.S. Committee and Council Meetings.

Nov. 1st.—All changes of address for insertion in the 1933 Register to be reported to the Registrar, R.C.V.S.

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Obituary

DEATH OF SIR RONALD ROSS

The Conquest of Malaria

The whole scientific world, and the medical profession in particular, mourns the loss of a supremely outstanding figure in British medicine, Sir Ronald Ross, whose death took place on September 16th at the Ross Institute, Putney Heath, at the age of 73. Ross's discovery of the exact relation between human malaria and mosquitoes—that the parasite of malaria fever is carried by the female anopheles mosquito—made him one of the greatest benefactors of mankind, for it is fast rendering the tropics safe for the white man. The epic story is familiar to our readers, and the veterinary profession pays heartfelt honour to the memory of a man whose life-work was one long tribute to the supreme importance of the study of the part played by the lower forms of life in the transmission of disease to man.

Returning to India after consultation with Sir Patrick Manson as to a line of investigation, Ross, after patient and baffling researches, made his first great discovery: a particular species of mosquito did absorb malaria germs when they sucked the blood of patients, and these germs went through definite and hitherto unknown stages in their life history within the body of the insect. The next step in Ross's investigation was more difficult, and even more novel. Adopting another suggestion from Manson, to whom he gave full credit, Ross studied the malaria of birds, already shown by Laveran to be due to a similar organism. He traced the progress of the absorbed germs to a stage in the stomach, and then to a further stage in the salivary gland. When the infected mosquito pierced the skin of a healthy bird it passed the malaria germs with its saliva into the bird. The malaria organism, as was afterwards confirmed in human malaria, was not passed directly from victim to victim by the mosquito as by a dirty instrument, but went through regular stages of its life history in the insect, of such a nature that it did not become immediately infective to a new host for a period of 12 days in the case of human malaria.

Thus Ross traced the malaria germ from victim to victim, showed precisely how the mosquito acted as the carrier, and what changes in the germ took place in the insect. His brilliant scientific success was followed by a long period of scepticism and official delay most trying to a man of Ross's ardent temperament, and partly the cause of what might be called the impatience with which afterwards he pursued a tenable claim that biological discoveries of advantage to humanity were as deserving of pecuniary reward as inventions which could be patented.

After a strenuous campaign for public support, he founded the Ross Institute and Hospital for Tropical Diseases at Putney Heath, of which he was the Director-in-Chief, with the design of making it a centre of treatment and research as free as possible from the official trammels which he himself had found irksome. It was opened by the Prince of Wales in July, 1926.

In *The Times* of September 14th, Sir James Barr, chairman of Committee of the Ross Award Fund, announced that the total sum raised for Sir Ronald Ross amounted to £15,513. "Thanks to this fund," said Sir James Barr, "Sir Ronald Ross's anxiety for the late Lady Ross was removed, his declining years are being made happier, and the fund is now closed." Lady Ross was Sir Ronald's unwearied support and helper in all his work.

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R.C.V.S. OBITUARY

Talbott, Henry Watson, The Laurels, Whatton, Notts. Graduated London, December 17th, 1875. Died September 15th, 1932; aged 83 years.

Mr. Talbott came of a very old Notts family of veterinary surgeons, his father and several brothers being in the profession. He was born at Whatton-in-the-Vale, but for some years resided at Sutton, near Granby, returning to his native village 36 years ago.

He was veterinary surgeon to the Belvoir Hunt for a long period, and was personally known to the late Duke of Rutland and the present Duke.

"Mr. Talbott was passionately fond of hunting, and in his younger days was a hard rider to hounds. Mr. Talbott also was keenly interested in cricket, playing for teams in the Whatton district," says the *Nottingham Journal*. "He was known to everyone in the Belvoir country, and knew every person of importance following hounds there for over half a century."

Mr. Talbott leaves two sons, Mrs. Talbott predeceasing her husband some years ago.

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NORTHERN LADIES' EFFORT FOR THE "VICTORIA" FUND

Information has only now reached us that on June 15th the ladies of the North of England Division, N.V.M.A., repeated their successful effort of the previous year in raising a handsome contribution to the Victoria Veterinary Benevolent Fund by means of an "American Tea." This was given by Mrs. J. W. Rider, at her residence at Beamish, Co. Durham, when she was assisted by many members of the Division and their ladies, as well as by a large number of other friends. The total amount realised for the Fund was £21.

PERSONAL

Mr. George Howie, F.R.C.V.S., has been appointed Hon. Secretary and Treasurer of the North of Scotland Division, N.V.M.A. Mr. Howie succeeds Captain J. McAllan, who will shortly take up his appointment in Northern Ireland.

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Wills.—Danels, Lieut.-Colonel Leonard, R.A.V.C., of Bolton Gardens, S.W. (net personalty £8,093), £8,173.

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Jones, Mrs. Gertrude Rose (59), of St. Mary Cray, widow of Stanley William Jones, M.R.C.V.S. (net personalty £21,574), £28,016.

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Marriage.—Aspden—Calderwood.—On September 14th, 1932, at St. Mary's Parish Church, Clitheroe, by the Rev. W. S. Helm, M.A., Thomas Guy, the elder son of the late Mr. Harry M. Aspden and Mrs. Aspden, of Blackburn, to Mary Emma, twin daughter of Mr. J. Kerr Calderwood, M.R.C.V.S., and Mrs. Calderwood, of Clitheroe. At home October 27th and 28th, 1932, at Glenburnie, Parsonage Road, Wilpshire.

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ROYAL SANITARY ASSOCIATION OF SCOTLAND

Mr. Hugh Begg's Presidential Address

The fifth annual Congress of the above Association, which was held at Elgin during the first week of September, was particularly noteworthy to veterinarians in the fact that, for the first time, the position of President was occupied by a member of the profession.

In his presidential address, Mr. Hugh Begg, F.R.C.V.S., Chief Veterinary Officer for Lanarkshire, stressed the dangers to human beings resulting from tuberculosis in dairy herds. Mr. Begg pointed out that, if those who were designing plans for the eradication of bovine tuberculosis or engaged in propaganda for the establishment of more and more tubercle-free herds had, at that juncture, the advantage of the disease situation as it existed fifty years ago, the problem would be a relatively simple one. It would be more closely akin to that of the United States and Canada, where, because the incidence of the disease was but a fraction of that now obtaining in Great Britain, the work of eradication, though admittedly huge in respect of area, was proving a comparatively easy and practical proposition. The elimination of bovine tuberculosis from our herds was not, however, an impossible proposition. It could be accomplished in Great Britain in a very few years if sufficient funds were available, and if we could withstand the consequent dislocation and reduction of our milk supplies. The cost would probably be the governing consideration.

Suggesting an age limit for cows as one method of tackling the problem, Mr. Begg said that in the last ten years we have had much surplus milk, and the milk industry could well support the immediate loss of all the produce of every cow in the country over ten years of age.

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ERADICATION OF BOVINE TUBERCULOSIS

Mr. James Mackintosh, the eminent agricultural authority, in an article in the current issue of the *Journal of the Royal Agricultural Society*, describes the steps already taken in England and other countries to reduce the incidence of tuberculosis amongst cattle herds. Vaccine-conferred immunity is still an experimental process and the most hopeful method for adoption in Great Britain would seem to be testing and the segregation of reactors, though greater uniformity in the application and interpretation of the various forms of tuberculin test is desirable. It is gratifying to us to note that Mr. Mackintosh is not amongst those who question the practicability of the scheme put forward by the National Veterinary Medical Association. On the contrary, he regards its early adoption as of importance both in the interests of the cattle industry and of the health of the community, and states that the cost, if shared by the State, the local authorities and the farmer, should not be heavy. As a preliminary to the development of definite "accredited" areas, amplification of the Tuberculosis Order is recommended so as to ensure a general systematic inspection of cattle, by means of which tubercle-free beef and dairy herds may be built up. In this respect the Milk (Special Designations) Order has been of definite use by providing the only official recognition in Great Britain for herds which have been tested and contain no reactors.

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ARMY VETERINARY SERVICE

London Gazette—War Office—Territorial Army

Sept 16th.—Maj. R. Hayes resigns his commn. and retains his rank, with permission to wear the prescribed uniform (Sept. 14th).

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HOME SECRETARY AND DENTAL COMPETITION

In a letter to a correspondent who approached him about a competition proposed to be held by the International Dental Federation, under which certain experiments would be made on dogs, Sir Herbert Samuel says: "So far no application for authority to perform experiments here in connection with the competition has reached me, and any general decision which I may form must, of course, be subject to the consideration of the facts and arguments which might be put before me in support of a particular application (supposing one were made). But as at present advised I am of opinion that no sufficient justification has been made out for permitting such experiments here, and that to do so would be contrary to the intention of the Act regulating experiments on living animals."

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INCOME TAX ALLOWANCE FOR MOTOR WEAR AND TEAR

A correspondent having raised the above question, we approached the Income Tax authorities on the matter. The following reply is reproduced in the belief that other members also will find it of value:—

"The position for the current year is that under Section 18, Finance Act, 1932, the allowance for Wear and Tear is authorised to be increased by 10 per cent. The rate of the allowance rests entirely with the Local Commissioners and it does not follow that the allowance to professional men who use their cars for professional purposes is 20 per cent. in all cases. However, assuming that the Commissioners are prepared to concede an allowance of 20 per cent. then under Section 18, Finance Act, 1932, this allowance would be increased to 22 per cent. and not 30 per cent., as suggested.

"The provisions of Section 18, Finance Act, 1932, apply to all cases where an allowance for Wear and Tear is granted and is not confined to any particular profession or trade."

IRON TONIC AND ANÆMIA

During the course of the proceedings of last week's British Pharmaceutical Conference, several technical papers read mentioned the uses of iron in cases of anæmia. Twenty years ago, it was said, iron was used very successfully in the treatment of anæmia, and chemists thought the treatment would be even more effective if they could get a product "free from all impurities." When they had secured freedom from impurities they found that the new tonic was by no means so good as the old. After much research it was discovered that the value of the tonic depended on the presence of a little copper with the iron. Experts described to the Conference methods of finding the precise amount of copper there should be in an iron tonic for the treatment of anæmia.

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BOVINE MASTITIS

At the recent meeting of the Council of the Royal English Agricultural Society, it was reported by the Research Committee that in the course of a brief report regarding the bovine mastitis investigation now proceeding at the Animal Pathology Research Institute of the Royal Veterinary College, Sir Merrik Burrell had mentioned that one of the rather interesting things which had been brought to light was that, even if cows showing no outward and visible signs of anything wrong were infected with mastitis, there was a definite depression in their milk yield.

Dr. Minett, in one of the big herds under his supervision, had divided the animals into two groups. The first group was completely free from any disease and the other was free from every disease, as far as he could ascertain, except mastitis, and this in most cases could only be found by laboratory test; it could not be detected in the cowhouse. There were 39 lactations in the first group and 56 in the second group, and on an average the cows in the second group gave 160 gallons less milk each than the ones in the other group. That alone caused a loss to the herd owner of £597. It would be seen, therefore, that even a slight, latent infection among the cows caused a very serious monetary loss. Immediately the mastitis infection was complicated by any other infection, such as contagious abortion, the milk yield again was seriously diminished. Dr. Minett was now examining the different strains of organism causing mastitis, and he found no less than 137 different strains of streptococci.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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ANTI-ERYSIPELAS SERUM

To the Editor of the Veterinary Record.

Sir,—On the 6th day after infection of a finger, occasioned in opening a capsule of swine erysipelas culture, the seat of infection became inflamed and painful. This rapidly became worse, part of the finger becoming purple-black with some feverishness, etc.

On applying to Bayer Products, Ltd., who supplied the culture, they with great promptitude sent me a supply of Rotlauf-Serum *ad usum* human, and 20 c.c. of this was injected intramuscularly by my doctor on the 10th day and 10 c.c. on the 12th day, with rapidly favourable results.

Practitioners in districts where swine erysipelas is frequent may be glad to know that if such an accident as the above occurs, the remedy is readily available and very effective.

Yours faithfully,

Deal. A. T. Crowther.

September 14th, 1932.

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POST-GRADUATE DEGREES

To the Editor of the Veterinary Record.

Sir,—From my own point of view, the greatest deficiency in the British University system is the extreme difficulty that exists in an M.R.C.V.S. obtaining a post-graduate higher university degree in Science.

The standard of the M.R.C.V.S. qualification, I believe, is similar to, if not higher than, that of a B.Sc. of one of the British Universities. While the subjects of the latter are fewer, possibly taught more exhaustively and in examinations a higher standard in them is possibly required, yet the M.R.C.V.S. course embraces many more subjects, most are taught in the four years' course to a very fair standard and in examination a very fair standard is maintained. In the five years' course a still higher standard in teaching and examination will be aimed at.

Despite this the fact, however, remains that no British University will accept my own M. (or F.) R.C.V.S. as an equivalent of their B.Sc. in order that I may attempt a D.Sc. or M.Sc. degree as an external student, so the result is that whatever standard of efficiency I may attain or whatever name I might make for myself I should never be able to present myself for a British D.Sc. or M.Sc. without putting in several years in attendance at a University—being taught, once more, the rudiments of Science. As my present employment produces my only income I could not, and would not if I could, abandon it to start again, at my age, as a student. It is equally unlikely that I should do this when I retire on pension and I may, of course, die before my time for retiral.

Should I, however, go to the Continent I should have no appreciable difficulty on my M.R.C.V.S. and the work I have already done, in being allowed at least to attempt a D.Sc. degree. I might have to put in some time and work but no more time than I could obtain by combination of my long leave and study or half-pay leave.

I believe, and most British people I have no doubt also believe, that the British D.Sc. and M.Sc. degrees are of a higher standard or value than others. I plead for no reduction of standard —no one wants a "cheap" degree—but I do consider that I should be allowed to attempt such a degree, if I want it; with the inevitable failure if my work is below the standard required.

The academic answer to my complaint, I understand, is that I should have taken a B.Sc. when at College.

When I was at University College (1908-1909) I did get as far as an Intermediate Arts Examination, but finances made continuation impossible—as did my own lack of interest at that time in any form of work except in the one subject that happened to take my fancy (Zoology). I did not start at a Veterinary College until five and three-quarter years later, having in the interval clerked, farmed, and campaigned. I could not afford, I thought, two separate courses and was indeed afraid that if I did attempt both I should gain neither degree, after my long holiday from serious brain work.

Another very important point, which does not seem to me to be sufficiently considered, is that

those who take their D.Sc. or M.Sc. straight after school very often are not taking up work which they are best suited for and in which they will therefore be likely to produce the best results. Those who drift later in life to some specialist branch of our profession do so from natural inclination; such work gives them pleasure and in it they may well produce the best that is in them. When I qualified even, a mere twelve years ago, I had no inclination whatever towards the Research side of the Profession, let alone any particular interest in the Helminth work on which I now spend so much of my time.

I do think that the British Universities should reconsider this question and endeavour to enrol men of sufficient ability in their own ranks rather than have them seek Continental or other degrees with the consequent loss to the British institutions of connections, material and publications, as well as of a certain amount in fees.

While I write only of myself there are, no doubt, numerous others in the Profession who have taken up some special branch of work and who do, or would be willing to do, a great deal if they could thereby attain the distinction of a British D.Sc. or M.Sc.

To some the addition of a few more letters after their name is of little importance, but to myself a D.Sc. represents an ambition—unattainable, at present, in Britain.

I am, Sir,
Your obedient servant,
G. B. Purvis, f.r.c.v.s.

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PATHOGENICITY OF RAT-POISONING PREPARATIONS AMONGST OTHER ANIMALS

To the Editor of the Veterinary Record.

Sir,—I see that Mr. W. P. Blount, in opening the discussion on Mr. Lovell's paper, as reported on page 1062 of the *Veterinary Record* of September 3rd, 1932, asked whether a certain proprietary preparation for the extermination of rats was pathogenic amongst other animals. About three months ago I was asked by a rabbit owner having a large number of well-bred pedigree rabbits to call and see what was the cause of their being suddenly taken ill and dying in a day or two. I was told that owing to the place being infested with rats a fair quantity of this preparation had recently been put down, and that the rats had some degree of access to the ground on which the hutches stood.

The first rabbit to be taken ill was one, a half-grown blue beveran, which had been bitten by a rat a few days before. This rabbit and about half of the animals first affected recovered, but the disease spread and increased in virulence, until 26 had died. It attacked both young and old and the symptoms were the same as are produced in the rat, namely, sudden illness, a dull, dazed condition, great swelling of the abdomen.

I opened and examined for coccidiosis nearly all that died, but although a veterinary surgeon who examined one which was sent to him stated that coccidiosis was the cause of death, I found on *post-mortem* examination one great peculiarity in every carcass except one (which showed under the microscope severe infection by coccidiosis), namely, impaction of the large gut with apparent paralysis of that viscus. Having opened a very large number of rabbits with coccidiosis, I found that *post-mortem* appearances were very different from those of that disease. Some carcasses were practically free from coccidiosis and the customary lesions, which I unfortunately know only too well, were not present.

One hutch was not disinfected after being used by an affected rabbit and within a fortnight or so an apparently healthy rabbit was put in it. That rabbit after a few days became similarly affected and died. Close by the rabbits were a number of chickens, to the quarters of which the rats and mice had access, but they were not affected. Many of the rabbits were two or three years old, and, except those mentioned, fat and healthy to all appearance. The question arises, if I kill and eat such an apparently healthy, but infected, rabbit, will it make me ill?

Yours faithfully,
T. F. Prime.

Upper Norwood.

Diseases of Animals Acts, 1894 to 1927

SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
Period 16th to 31st August, 1932	No. 5	No. 6	No. —	No. —	No. 6	No. 6	No. 15	No. 27	No. 13
Corresponding period in 1931	19	25	11	1,432	2	2	12	65	40
1930	7	89	—	—	2	2	11	68	45
1929	15	15	—	—	6	6	19	116	81
Total 1st January, to 31st August, 1932	251	309	6	431	97	157	161	1,207	598
Corresponding period in 1931	338	380	90	9,910	106	173	207	1,314	551
1930	256	281	—	—	167	253	283	1,702	719
1929	306	384	23	1,895	162	327	372	1,532	919